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EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

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VOL. XL., No. 7. FRIDAY, FEBRUARY 16, 1906.

On February 12, in the United States Senate, Senator Lodge delivered a remarkable speech on rate regulation. It was remarkable because it wasted no time in doubtful economics of highly debatable points, but viewed the suggested regulative measures solely with the purpose of finding out what they would accomplish. "What is really the matter, and what can we really do about it?" might have been the text of this speech, to which we will give fuller space in a subsequent issue. The following quotations are straight to the point:

"In nine cases out of ten when I have talked with any one who was very eager for general railroad legislation, and especially for Government rate making, I have found that the special grievance complained of was a personal and not a place discrimination."

"Government rate making is not, and cannot furnish, any remedy by and of itself for personal discrimination or rebates."

"To sum what we may learn from English experience, we find that the provision against increasing rates has prevented the reduction of rates, that undue preferences or rebates have been successfully stopped, that discrimination between localities exists and that the long and short haul discriminations are not interfered with. It therefore appears that in England the rate making by Government, so far as it has gone and so far as it affects discriminations between localities, has had either no result or has prevented rate reductions."

"The experience of all other countries, taken as a whole, shows us that it is entirely possible to abolish all discriminations between persons * * * * that Government rate making has not lowered rates, but has made them not only higher but inelastic * * * * that Government rate making has not stopped discriminations between localities in the slightest degree."

"Two dangers seem to me to menace this legislation. The first is that in the desire to have rates fixed in some form by an executive commission, exercising powers delegated to it by Congress, we shall fail to give an effective remedy for the worst evil which has arisen, that known as 'personal discriminations.' Whatever else governmental rate making can do, it cannot, by the mere fact of its existence, do away with an offense which consists in the evasion of an established rate. * * * * The second danger is that rate making by the Government, which can only affect excessive rates and place discriminations, will go too far, and will bring on evils far more serious than those it is designed to cure."

We devote this week an unusual amount of space to the thorough and interesting document prepared by Mr. James McCrea to show why passenger fares should not be arbitrarily reduced to two cents per mile in the State of Ohio. The paper discusses at length many points that are thoroughly familiar already to readers of the *Railroad Gazette*, but it does no harm once in a while to round up a subject and view it broadly, from a standpoint somewhat remote from the nearness of daily practice. The arguments made by Mr. McCrea, which should at once strike the technical and the non-technical reader as being most effective in the advance of his cause are, first of all, that the profit of passenger business depends wholly on passenger density. The writer is forced in making his argument to apportion costs between freight and passenger traffic, else he could find no way of determining whether or not a service was profitable. It is, of course, impossible to say accurately that any one kind of a traffic on a railroad costs a certain amount or a certain proportion of the entire amount of expenses to handle, but we are disposed to agree with Mr. McCrea that it is fair enough in a broad comparison to pro rate expenses on a train mile basis. When this is done it is perfectly clear why Eastern lines can make a profit out of their passenger business when Western lines cannot, for a road must be maintained and fixed charges must be paid whether a train a day or two hundred trains a day are run over the track. It may be objected that on lines doing an abnormally heavy freight business and an abnormally light passenger business it would be impossible to make the passenger business pay for itself; that a rate which would actually bear the requisite proportion of expenses would drive away traffic. There are cases, undoubtedly, where this is true, and here the railroad must make a voluntary sacrifice, either to build for the future or to comply merely with its charter requirements. Mr. McCrea did not go into this, and he did not need to. What he set out to do was to prove to the

Legislature of Ohio that his passenger charges were clearly not exorbitant and not unduly profitable to the company. He showed this convincingly by proving that much of the passenger traffic on the lines in which he is interested is done at a figure which returns no profit at all to the company. His second main point rested on this proved assumption that a reduction of passenger fares in Ohio is a tax, and that the taxes paid by Ohio lines are already abnormally high in proportion to the gross earnings of the roads. The issue is thus presented squarely. If the Ohio legislature wishes to tax the roads further, let it do so under true colors.

In the discussion by the Western Railway Club last month of the uses and advantages of card index systems in motive power departments, Mr. Parish, of the Lake Shore, referred to the superiority of industrial concerns, and particularly the large corporations or trusts, over the railroads in the matter of knowing accurately their shop costs. The conditions are not similar, of course, and the greater difficulty of keeping, or arriving at, costs in a locomotive shop are well known. To keep the costs of manufacturing only would be comparatively easy, but the proportion of pure manufacturing in the majority of shops is small. Repairs constitute the principal output, and repair costs are difficult; in fact, next to impossible, to determine accurately under the methods which obtain generally, taken in conjunction with features which are to a greater or less extent unavoidable in railroad practice. A typical instance will suffice to illustrate this point. The average roundhouse is very deficient in facilities for making repairs to locomotives, therefore any machine work, for instance, that may be necessary has to be done in the "back shop." A machinist at work on an engine in the roundhouse brings to the shop a piece to be machined at once. The foreman orders a man on a lathe, say, to lay aside the piece on which he is engaged for the roundhouse job, which takes an hour or two, perhaps; the repairer meantime having to wait—or he probably does wait, whether he has to or not. Or if the emergency requires it, a piece is taken from an engine of similar class in the shop, just ready to go out, maybe, and its departure delayed until another can be made. This sort of thing, these emergency happenings, are occurring continually and in a variety of which only the man who has experienced them has any conception. The difficulty of any attempt to keep an accurate record of repair costs under such conditions is obvious, especially in shops where the methods which constitute present general practice prevail. Piecework shops, however, having the individual operation system, find themselves able to ascertain these costs with much greater accuracy than was formerly possible, especially, as Mr. Parish says, after the system has been in force long enough for every one to have a thorough appreciation of the importance of getting at costs correctly. He adds that the use of a card system is a great help in this connection.

If we take the railroad commissioners' report and the grand jury's report and read them together, we shall be pretty likely to conclude that the engineman who failed at Baker Bridge, Mass., in November, had actually worked 16 hours a day for five successive days, in the week preceding that collision—which gives a very practical aspect to the commissioners' dictum that working hour limits should be "rigidly" enforced, by a rule to which exception shall be made only in cases where no risk of life is involved. As any little mistake made by an engineman may endanger lives, the only possible interpretation of this reccommendation is that the rule for enginemen's hours shall recognize no exceptions whatever. This is a hard saying; who can hear it? Yet it is perfectly logical. Think of the glowing terms which are used in describing the skill, alertness, fidelity and courage of the ideal engineman; do they not always imply a man in the full possession of every faculty, with body and mind in perfect health? And is any railroad officer ready to "stand for" the assignment of any but an ideal runner to a fast express train on a busy railroad? Of course not, in theory. But how shall we reform our practice? One way is to stop trying to work so close to the limit. The Great Western Railway of England, in replying recently to a question from the Board of Trade concerning overwork, said:

> "The company have made elaborate and detailed arrangements for the relief of guards and enginemen whose trains are delayed on the road, and who are therefore prevented from reaching their destination stations within the booked hours of duty. For example: A goods train has suffered such serious delay as to make it probable that it will not reach its destination under, say, two hours after the booked time. In such a case the men are relieved before arriving at the destination station and are allowed to proceed home as passengers, having of course no duties either actual or theoretical—to all intents and purposes resting. Moreover, in order that the men shall not be prejudiced in any way by the late arrival of their trains they are paid wages at the usual rate for the time occupied in traveling from the point at which they are relieved to their destination station."

Whether or not this regulation was forced upon the company by an arrogant labor union or was the voluntary action of a cautious superintendent, we do not know; but it is an excellent rule. It must be somewhat costly in money and it must often seem wasteful and unnecessary. Moreover, the putting of fresh men on a train will not always prevent mistakes. But who can devise any other way of avoiding a share of the responsibility for the errors and negligence of men who are kept too long on duty? In contrast to this English practice we heard recently of a collision on a prominent road in this country where the engineman at fault had been on duty 27 hours. He had been detained by a landslide. Quite likely he had slept a part of the time while waiting. It may even be true that the delay was not the real chief cause of his mistake. Nevertheless, the only way for the superintendent to wash his hands of responsibility in such a case is to provide the best possible arrangements for relieving men some hours before they are exhausted, and for providing this relief wherever it may be needed—not at the "terminal," which may be 150 miles away. American legislation has been very lenient in allowing all sorts of dangerous practice on railroads in emergencies. Emergencies are just the time when all safeguards are important. We cannot adopt safeguards without increasing expense, but the increase would be far more rational than many increases that have been approved in the past. Why should not you, on your road, have a larger list of spare enginemen, and a higher grade of men on that list? Possibly a satisfactory condition may be attainable only by returning to the traditions of the fathers, and having a small force of men paid by the month, regardless of the number of days worked.

FURTHER ROCK ISLAND RETRENCHMENT.

For the last eight years the St. Louis & San Francisco Railroad has paid a dividend on its second preferred stock; for four years regularly at the rate of 4 per cent. During the last financial year a great deal of refunding and readjustment of securities came due, all of which was sucessfully accomplished. On Friday of last week, with gross earnings for the half year, June 30 to January 1, about $1,000,000 greater than for the corresponding period a year ago, the directors announced that the quarterly dividend on the $16,000,000 second preferred stock would not be paid. Ordinarily it would be surprising to find a railroad after having so successfully weathered large new capital requirements and with earnings so distinctly on the increase, passing a dividend paid almost continuously since reorganization ten years earlier. Last fall, however, a new plan of action was adopted in the management of the Rock Island properties. The 4 per cent. dividend on the preferred stock of the controlling Rock Island Company early in January was passed and there was announced an extensive campaign of improvements on the lines of the Rock Island System. Operating conditions on the Frisco System were similar—a high operating ratio and in particular an unduly large proportion of gross earnings used for conducting transportation. It is therefore natural to find a parallel policy under way on the Frisco lines. Particularly does it seem, as did the passing of the Rock Island dividend, conspicuous only in its lateness, when it is realized that immediate needs for additions, improvements and new terminal facilities now calling for attention, aside from similar expenditures already authorized, will cost the St. Louis & San Francisco about $3,000,000. The $640,000 second preferred annual dividend requirement will cover only a part of this, but its application toward improved operating efficiency, following similar action on the Rock Island, is another step in the right direction. Every such move makes clearer the purpose of the principal owners of these allied railroad groups to run their properties as railroads rather than as credit factories. In this particular instance not only is the Frisco System itself directly benefited, but the financial position of all the companies will ultimately be strengthened. The New Jersey holding company's payments depend entirely on dividends received from the two groups of railroads. The more money that is spent out of "Frisco" earning on the line instead of being paid out in dividends,

the sooner will come the time when earnings will justify a declaration on St. L. & S. F. common stock, in which the Rock Island Company's funds are invested.

TWO OBJECT LESSONS IN RAILROAD HISTORY.

The New York, New Haven & Hartford Railroad Company has just sent out a circular which must be taken as an announcement of the official extinction of the aged and venerable Naugatuck Railroad of Connecticut. The Naugatuck road itself, prosperous and expanding, will, of course, remain vigorous and vitalized. But its entity, its outlines and perspectives and, with them its traditions, will pass away, merged and obscured in the larger New Haven system by which for years it has been held under a 10 per cent. lease. The final *coup de grâce* is in the form of a notice which shows that the New Haven, having acquired more than three-quarters of the Naugatuck shares, has, in effect, sold the road to itself at $300 a share duly mailed by check to shareholders, willing or unwilling, who still outstand. It is Connecticut law and the price paid is high though the form of procedure seems a bit unique; is, indeed, we believe the first proceeding of the kind under a Connecticut statute enacted recently. But we are not here discussing railroad ethics or law in the case or the merits or demerits of the proposition. Much more interesting are two object lessons in railroad history which the last chapter in the life story of the Naugatuck Railroad—in connection and contrast with a sister line, the Housatonic—calls to mind.

Two large valleys, the Housatonic and the Naugatuck, cut western Connecticut north and south. In a rough and general way the two valleys are thus parallel. The Housatonic valley, much the broader and longer, reaches well up into the Berkshire region of Massachusetts. The Naugatuck Valley shuts in several miles south of the Connecticut northern state line. Seventy years ago (1836) the Housatonic Railroad was chartered—with layout through the valley of the same name—and four years later it was opened. Sixty years ago (1845) the Naugatuck Railroad was chartered and four years later it was opened. Both roads had their southern terminal at Bridgeport on the sound with steamboat connections. The Housatonic line was 74 miles long, the Naugatuck, 56. Both roads were among the earliest three or four railroad lines opened in Connecticut and are to be classed in the "pioneer" group of New England local railroads. They were opened at a period when far more than now—at least in New England—the coming of the railroad was supposed to spell prosperity for the beneficiary region; and that fact, together with similarity of location and identity of the chief terminal, made their prognosis one of exceptional interest.

That prognosis, from the comparative viewpoint, was all in favor of the Housatonic. In operation it was the older road by nine years. At an epoch when water power was the unit of factory industry it skirted a large swift river abounding in narrows and falls and not seriously affected by summer drouth; while the Naugatuck was a much smaller stream occasionally running low in long hot spells. At its northern terminal the Housatonic tapped the Boston & Albany, a trunk line east and west, and later acquired a shorter cut toward Albany; the Naugatuck for two decades ended northward in a small factory village (Winsted) and the later east and west connection—the Connecticut Western, now the Central New England—was unimportant as a feeder. Finally the Housatonic was the longer line by 18 miles; and, as to original industries native to the soil, it cut a region of active iron mining and large secondary iron industry which at that time the Naugatuck had not. Nothing was wanting to make the relative forecast of the two lines one-sided with all the stars of the railroad horoscope blinking in the Housatonic's favor; and that horoscope seems now, in the back look of the larger fraction of a century, as one sided as it appeared then.

Paradox has been aptly defined as the truth walking backwards; and, in the case of the Housatonic and Naugatuck railroads, the anomalous definition stands. The strange outcome was just what could not have been predicted. The Housatonic led a staggering existence. It paid for awhile a dividend on its preferred stock, but, on its common stock, if our memory does not go astray, trifling dividends or none; and it was finally taken into the New Haven system not on any basis of intrinsic prosperity but for what President C. P. Clark used to call a "nuisance" value. *Per contra* the life story of the Naugatuck has run on lines just the reverse. After a comparatively short period of the hardship not uncommon in early railroading it reached a period of payment of dividends rising to 10 per cent. and was leased many years ago at that rate to the New Haven company, which now capitalizes the guaranteed dividend at $300 a share. Its essentially local business, due almost entirely to factory traffic, has been developed enormously. The Naugatuck valley proper is hardly more than 40 miles in length. But it may be questioned whether any valley of the same extent in the world registers a larger factory product in quality and volume; certainly none in the pace of its growth.

Returning to a comparison of the two valleys and their respective railroad lines and using the census returns for population in Connecticut towns tapped by the two lines as the test, the annexed tables are compiled—blanks in the first column of figures indicating townships set off from others and incorporated since the earlier census dates:

Housatonic Railroad.

Connecticut townships.	Population 1840.	Population 1900.
Trumbull	1,204	1,587
Monroe	1,351	1,043
Newtown	3,189	3,276
Brookfield	1,255	1,046
New Milford	3,974	4,804
Kent	1,759	1,220
Cornwall	1,703	1,175
Canaan	2,166	820
North Canaan	.....	1,803
Total	16,601	16,774

Naugatuck Railroad.

Connecticut townships.	Population 1850.	Population 1900.
Stratford	2,040	3,657
Milford	2,465	3,783
Derby	3,824	7,930
Ansonia	.....	12,681
Seymour	1,677	3,541
Beacon Falls	.....	623
Naugatuck	1,720	10,451
Waterbury	5,137	51,139
Plymouth	2,568	2,823
Thomaston	.....	3,300
Litchfield	3,953	3,214
Torrington	1,916	12,453
Winchester	2,179	7,763
Total	27,479	113,358

It will be seen that while the nine Connecticut towns served by the Housatonic road have remained practically stationary during sixty years the thirteen townships served by the Naugatuck have increased to more than four fold—about 312 per cent.—during a half century; and the disparity would be still more marked could the changes of population during the past five years be included. There are striking specific cases as well as the broad generalization. Thus, for an example, on the Housatonic line there is the station of Hawleyville in the township of Newtown. For more than a third of a century it has been a junction point where the Highland division of the New Haven system—formerly the New York & New England road—the Housatonic, the Litchfield branch and lines to Norwalk and thence to New York city, intersect. By every rule and precedent Hawleyville should have had its "boom"; yet it has remained all but stagnant and little more than a mere station. By way of contrast may be cited Torrington on the Naugatuck line some 45 miles from tide water. That township had in 1880 a population of 3,327, rising to 6,048 in 1890 and more than doubling to 12,453 during the last census decade—a growth western in speed while eastern in the solidity and permanence of industrial character.

When we turn to the more interesting subject of the causes of the disparity in the life stories of the two old railroad lines originally cognate and endeavor to interpret facts into forces, the problem somewhat deepens. Not a few of the elemental reasons reach back to subtle influences based on local tendencies, situation and character. Of the more patent historical causes there are ancient tales but somewhat explicit that tell of early old fogyism in Housatonic management and passenger fares and freight rates so high as to be deadly to progress. Much more definite as a ground plan of Naugatuck railroad prosperity was probably the good fortune which happened to locate in the valley great pioneers in the brass and copper industries introducing us to such names as Scovill, Phelps and Coe. From their large and successful enterprises, with not a few factories loading their tens of carloads each day, other and varied metallic industries have been offshoots. What we may call the "trunk" factories have branched out into others and prosperity and success generated a great brood of side products. In its broad aspect the object lesson of the history of the two old railroads, therefore, teaches the wisdom of liberal policy in the genesis of traffic and the vastness of the results of individual energy and enterprise. These two factors, conspicuous among others that are

obscure, have their special value and suggestiveness in railroad policy when one studies the almost fantastic contrasts of Housatonic-Naugatuck annals.

TRADE CATALOGUES.

In 1894, the Master Car Builders' Association, for convenience in the filing and preservation of pamphlets, catalogues, specifications, etc., adopted a number of standard sizes. The advantages of conforming to these sizes have been recognized, not only by railroad men, but outside of railroad circles, and many engineers make a practice of immediately consigning to the waste basket all catalogues that do not come within a very narrow margin of these standard sizes. They are given here in order that the size of the publications of this kind, which are noticed under this head, may be compared with the standards, and it may be known whether they conform thereto.

Standards.

Postal-card circulars	3⅜ in. by 6⅛ in.
Pamphlets and trade catalogues	3½ " by 6 "
	6 " by 9 "
	9 " by 12 "
Specifications and letter paper	8¼ " by 10¾ "

"The Road of a Thousand Wonders."—A veritable gem of the advertiser's art is being distributed by the passenger department of the Southern Pacific bearing the above title, the road in question being the Coast Line and Shasta Route of the Southern Pacific extending from Los Angeles through San Francisco to Portland, over 1,300 miles. To quote the title page, "these pages picture and tell of this region and its wonders, of the varied charms of sea and sky, of mountain and valley, field and forest; and of climatic features which mean summer all the year; of numberless resorts attractive for health-seeking idling enjoyment and all out-of-door recreation." The story is told in most alluring fashion, both in type and by numerous colored half-tones of surpassing beauty, all made from photographs. The book of 72 pages is magazine size, printed on plate paper with an embossed cover in green, gold and blue. Its beauty and artistic excellence entitle it to special commendation aside from its merit as a most creditable piece of advertising.

Compound Lever Track and Automatic Lowering Jacks.—A number of interesting illustrations and detailed descriptions of Buckeye jacks are given in a 28-page pamphlet published by the Buckeye Jack Mfg. Co., Louisville, Ohio. Among the illustrations are included a one-ton automobile jack, a 10-ton track or trip jack, and a number of automatic lowering jacks ranging in capacity from five tons to 15 tons. The last few pages of the pamphlet contain a number of highly complimentary testimonial letters from users of the Buckeye jacks.

High-Pressure Blowers.—This is the title of Bulletin No. 127, just issued by the B. F. Sturtevant Co., Boston, Mass. In condensed form it presents the essential features of this type of rotary or so-called positive blower, tabulates the proper sizes required for different capacities of foundry cupolas, gives the principal dimensions of horizontal and vertical types and illustrates methods of driving by direct-connected Sturtevant motors and engines. A detailed description of this machine was printed in the *Railroad Gazette* of Feb. 2, 1906.

Pneumatic Sanders.—The Watters A. B. C. pneumatic track sander, made by J. H. Watters, Asst. M. M., Georgia R. R., Augusta, Ga., is described and illustrated in a 12-page pamphlet just issued. Line and half-tone engravings illustrate the details of the mechanism and its application and operation. A large number of favorable testimonial letters from motive power department officers also are printed. E. G. Fisher & Co., Fisher Building, Chicago, are general western agents.

Locomotive Lubricators.—The No. 21 Detroit locomotive lubricator is described in a pamphlet just issued by the Detroit Lubricator Co., Detroit, Mich. The pamphlet also contains a large amount of helpful hints and other information which will prove interesting and instructive to locomotive enginemen, roundhouse foremen, and lubricator repairmen.

CONTRIBUTIONS

The Real Issue.

New York, Feb. 14, 1906.

To the Editor of the Railroad Gazette:

In the wilderness of words which have been printed concerning the need of regulating the railroads of the country by legislation or judicial action, the main facts seem to have been most of the time obscured, and the average reader rises from the perusal of an editorial, or Congressional report or debate, with anything but clear ideas of the problem which he is trying to grasp, or of the remedy which should be applied to the evils from which he suffers. This being so, I call your attention to a letter from the Governor of West Virginia which was read in the Senate last week by Senator Tillman, of South Carolina, telling of the difficulty of enforcing the laws in West Virginia. The Governor's complaint had to do with alleged discrimination by the Baltimore & Ohio towards small coal shippers, and said:

"It may be that the Pennsylvania Railroad Company does not legally own a controlling part of the Baltimore & Ohio or the Chesapeake & Ohio or the Norfolk & Western, but I have no doubt that an investigation will show that the Pennsylvania practically controls these three great trunk lines which traverse West Virginia, and which are the only means whereby the products of this state, including coal, can be shipped either to the lakes in the West or other markets in the East. Hence it is a fact that West Virginia to-day is in the grasp of a railroad trust which practically says what part of the state shall be developed and what shall not be developed, how much coal shall be shipped out of the state, to what points or ports it shall be shipped, and when it shall be shipped. Of course it makes its own rates, and we are helpless. The Pennsylvania Railroad is very largely interested in the production or shipment of bituminous coal; it will naturally look after its own interest and the interest of the people along its lines in Pennsylvania and elsewhere first of all, and therefore the interests of West Virginia are subordinated to the interests of these others, and our railroads, upon which we are dependent, are controlled by an alien corporation practically in competition with us."

Two significant comments were made on this letter. Senator Elkins, Senator from the same state in which the complaint arises, said that the shipper had an adequate remedy in the mandamus, but that there was a disinclination to employ this remedy; and Senator Foraker, of Ohio, said that the Governor's complaint "went to the heart of the railroad trouble all over the country;" a remedy for the evil complained of would do more than anything else to solve the railroad problem.

Senator Foraker is right; this is the heart of the trouble. Look at the facts. A citizen of Philadelphia, being a director in the Pennsylvania railroad and also in the B. & O.—Mr. John P. Green, for instance—votes as a director on the boards of both companies. He votes, we may presume, in a way to promote the interests of each company. Neither by himself, nor with his associates, does he control the policy of the B. & O., for he and all his Pennsylvania friends together, including the railroad company, own less than a majority of the stock. Moreover, it is readily imaginable that his course as a director of the B. & O. would not in the slightest degree be changed if he should divest himself of all interest in the Pennsylvania Railroad. In other words, the most unselfish and public spirited director of either company would act just the same if the roads were in active competition with each other.

In such a situation, what can the law do? If anything, it must come out squarely and say just what is meant: that it is against public policy for one group of men to own large blocks of stock in two separate and competing railroads. Have not these public officials learned, from the Northern Securities case, and from contemporary history, that the American people have never gone to this extent in trying to regulate the acts of the individual? If West Virginia wishes to regulate the Baltimore & Ohio railroad let her do it in the direct and obvious way—by legislative action concerning rates, and by taxation. It is tiresome to hear Senators and others talk so mysteriously about "problems" that are so simple when frankly dealt with.

G. M. F.

Wheeling & Lake Erie Earnings.

Pittsburg, Feb. 12, 1906.

To the Editor of the Railroad Gazette:

I notice on page 48 of your edition of February 9th you print the following information:

"Wheeling & Lake Erie.—The gross earnings for the six months ending January 31 were $2,900,293, an increase of $578,245; net earnings $829,981, an increase of $28,810."

I beg to correct this information by appending the true figures hereunder:

Comparative Statement of Earnings and Expenses, Six Months Ending December 31st, 1905 and 1904.

	Six months, ending— Dec. 31, 1905.	Dec. 31, 1904.	Percentage, inc. or dec.
Gross earnings	$2,899,200.59	$2,321,048.47	+25.0
Operating expenses	2,076,396.42	1,820,876.58	+14.0
Per ct., operating exp. to earnings	71.62%	78.45%	6.83
Net earnings	822,804.17	500,171.89	+64.50
Deduct fixed charges, interest and rentals	700,202.56	545,480.16	+28.36
Surplus	$122,601.61	$45,308.27	Deficit.
Better off six months ending Dec. 31, 1905, than six months ending Dec. 31, 1904.			$167,909.88
If we had received the same average revenue per ton-mile for the six months ending Dec. 31, 1905, as we did for the six months ending Dec. 31, 1904, our gross earnings would have increased			834,442.10
Or, 35.95 per cent. instead of			$578,152.12
And the ratio of operating expenses to earnings would have decreased from			71.62 to 65.8 per cent.

B. A. Worthington.

The Detroit River Tunnel of the Michigan Central.

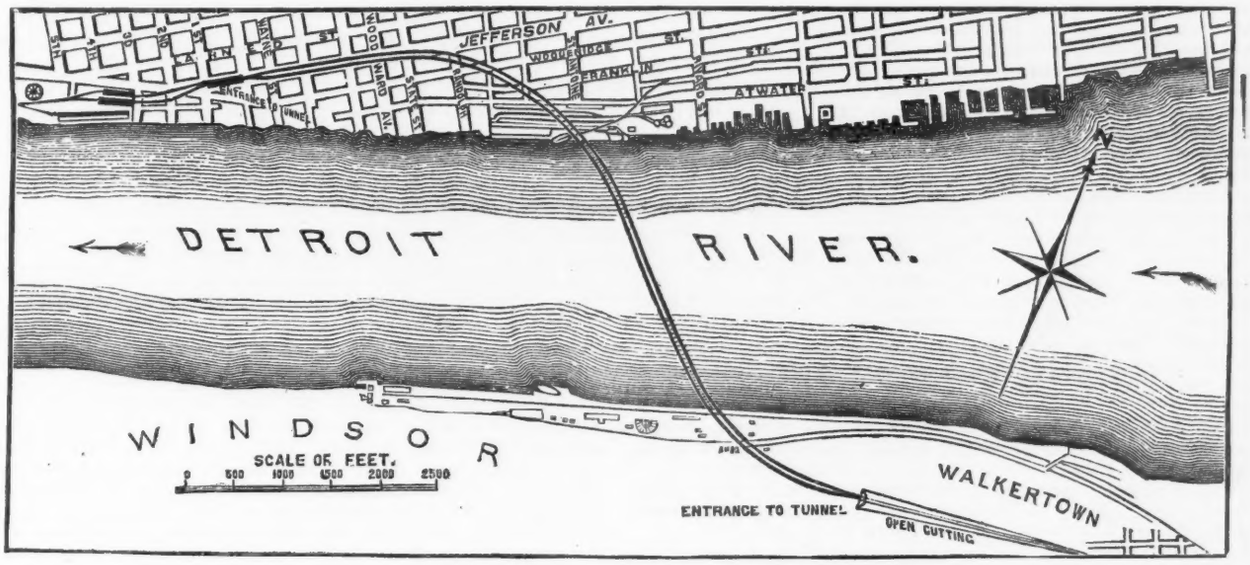
After vainly trying for a number of years to reach an agreement with the Grand Trunk for the building of a joint bridge or tunnel entrance into Detroit from Canada, the Michigan Central has finally decided to build a double-track tunnel under the river for its own use. Several years ago the Grand Trunk built a single-track tunnel under the St. Clair river at Port Huron, Mich., 55 miles north of Detroit through which through trains are run, but at Detroit all the through traffic of the Michigan Central, Grand Trunk and the Pere Marquette is ferried over the river to Windsor, Ont. The accompanying map shows the general railroad situation at Detroit and Windsor. The main line of the Michigan Central enters Detroit from the west and curving slightly after crossing the L. S. & M. S. at West Detroit continues on to the Third Street Station at the foot of Third street next to the river. The Toledo and Bay City divisions come in from the south and north respectively and join the main line at West Detroit Junction. The Wabash, Pere Marquette, and the Detroit, Toledo & Ironton come in from the south along the river bank over the Detroit Union Railroad Depot & Station Co. tracks to the Union Depot, just west of the Michigan Central Station on Third street. This station is also used by the Canadian Pacific for trains ferried over the river at the foot of 18th street. The Lake Shore enters from the south and swings almost entirely around the north end of the city to a connection with the Grand Trunk tracks running down to the river. The Lake Shore and the Grand Trunk use the Brush Street Station, about three-quarters of a mile above the Michigan Central Station.

On the Canada side, the Michigan Central terminal is a little below the Third Street Station on the Detroit side; the Canadian Pacific terminal is almost opposite the Third Street Station; and the Grand Trunk, Wabash and Pere Marquette are still farther up the river opposite Brush Street Station. All of the passenger stations are head end terminals and movements of trains from the stations to the ferry slips are in the reverse direction. The Wabash Pere Marquette and Canadian Pacific ferry slips on the Detroit side are more than a mile and a half from the Union Station, the Michigan Central slips are over half a mile away and the Grand Trunk slips are about the same distance from the station.

It will be seen from the map how difficult it would have been to locate a bridge or tunnel anywhere along the river front which would give satisfactory facilities to both the Grand Trunk and the Michigan Central. Any compromise situation would have involved the abandonment of valuable terminal property by one or both roads and neither would consent to such an arrangement. The fact that all the railroad terminals are situated on the river front complicated the problem of building a joint terminal because of the length of the approaches required for either a tunnel or a bridge.

The history of the tunnel project is interesting. In the late sixties the Michigan Central and the Great Western, now the Grand Trunk, came to an agreement to build a joint tunnel under the Detroit river and the Detroit River Transit Company was incorporated to own and operate it. The legislature of Michigan passed a bill authorizing the construction of the tunnel and the Dominion Government likewise passed a bill for the same purpose. Mr. J. F. Joy, President of the Michigan Central, was also president of the Tunnel Co., and he employed Mr. E. S. Chesbrough, then City Engineer of Chicago, to prepare plans. Mr. Chesbrough had only recently completed the waterworks tunnel, two miles out, under Lake Michigan, at Chicago, and also a roadway tunnel under the Chicago river. He made borings and drew up the plans for two parallel tubes, each to contain a single track. The accompanying map, reproduced from the *Railroad Gazette*, April 2, 1870, shows the route of the tunnels as proposed. The estimated cost of the entire improvement was $2,650,000. No work on the tunnel was ever done, however. Years went by with the tunnel project being revived periodically. In 1904 the two railroad companies again tried to agree on some scheme for crossing the river. A bridge was talked of, and Boller & Hodge, the engineers for the Wabash bridge at Pittsburg, were asked to prepare estimates and plans for a suitable overhead structure. While their plans were never made public it is understood that they were prepared to recommend a through steel truss bridge, with 600-ft. spans and 150 ft. under clearance, reached by elevated approaches through Detroit, involving an entire rearrangement of the yards and terminals of both roads.

Having failed to make joint arrangements with the Grand Trunk, the Michigan Central decided to abandon the bridge project and to build a tunnel for its own use at the most convenient point under the river. An advisory board of engineers was created last year to draw up plans for a double tunnel to be operated with electric locomotives. This board consists of Mr. W. J. Wilgus, Vice-President of the New York Central; Mr. H. A. Carson, Chief Engineer of the Boston Rapid Transit Subway, and who has recently completed the East Boston tunnel under Boston harbor, and Mr. W. S. Kinnear, Assistant General Manager of the Michigan Central, who was formerly Chief Engineer of that road and who will act as Chief Engineer of the tunnel company after the contract is awarded. The Detroit River Tunnel Company has been incorporated in Michigan and Canada to build the tunnel. Bids on the work have been asked for by March 8, and as soon as the contract is awarded work will be begun. The tunnel company has practically completed excavation for the Windsor shaft and has commenced excavation for the Detroit shaft.



Proposed Tunnel under the Detroit River.

(Reproduced from The Railroad Gazette, April 2, 1870.)

After a careful study of all the topographical and traffic conditions on both sides of the river the Advisory Board of Engineers decided on the location shown on the map. The approach grade on the Detroit side begins at about the intersection of 15th and Baker streets. The tracks leading to the Third Street Station will be deflected to each side of the open approach cut and brought together again over the approach tunnel about 1,400 ft. beyond the portal. The open approach section will be 1,510.5 ft. long, beginning with a 1 per cent. descending grade which increases to 2 per cent. before reaching the portal. This grade is continued through the approach tunnel and for the first 600 ft. of the subaqueous tunnel from which point it changes on a vertical curve to level. About 300 ft. from the Windsor end of the subaqueous tunnel the grade again changes to 1.4 per cent. ascending, increasing to 1.5 per cent., which is continued to the eastern summit. The Detroit approach is a tangent to station 150. A 2-deg. curve changes the alinement to station 164, where the river tangent begins. On the Windsor side the 2-deg. approach curve begins at station 184 and connects with the approach tangent at station 198. The river tangent is located at a slight angle to the center line of the river

at the crossing. The entire length of the tunnel and approaches is 12,800 ft., of the tunnel 7,860 ft., and of the subaqueous section 2,625 ft. for the west-bound track, and slightly less for the east-bound track.

Subaqueous Tunnel Section.

The width of the Detroit river at the point of crossing is about 2,600 ft. The minimum depth is 19.7 ft., and the maximum depth of the channel in the center of the river is 47.2 ft. A complete series of test bores was made on both sides of the center line of the tunnel from portal to portal. Most of the holes were drilled 30 or 40 ft. below the level of the bottom of the tunnel, and the core samples obtained showed favorable ground. The river bed is underlaid with stiff blue clay, containing some gravel and occasional sand pockets of small size. Bed rock is from 20 to 40 ft. below the bottom of the tunnel and the clay on top contains few boulders of any size. The maximum velocity of current in the river was found to be 2.31 miles an hour, the maximum velocity at the bottom 1.56 miles an hour, and the minimum velocity at the bottom 0.8 miles an hour; these currents are not swift enough to produce much erosion of the hard clay bottom.

It was necessary to fix the location of the portals of the approach tunnels, as shown on the plan and profile, because of the yard and terminal arrangements required on both sides of the river; and to keep the grades in the tunnels within reasonable limits, the top of the tubes must be kept very close to the bottom of the river. Under these conditions, driving the tunnels with the common shield method would involve filling a mat of clay or other material over the places where the roof is near the bottom of the river in order to hold the compressed air in front of the shield. To overcome this difficulty Mr. W. J. Wilgus, one of the members of the Advisory Board of Engineers, has devised a method of building the tunnels designated as Design A, which is entirely original and as yet untried, but which apparently has many advantages over any previous method in use for similar work. The specifications have been drawn to give the bidders the option of selecting any or all of four methods proposed or of submitting alternative plans of their own for doing the work in some other way. The three other methods included in the specifications are:

Design B: Trench method suggested by Mr. H. A. Carson, member of the Advisory Board of Engineers, but differing essentially from Design A.

Design C: Trench method, being a modification of Design A.

Design D: The common shield method using compressed air, the same as is being employed in the tunnels under the Hudson and East rivers, New York.

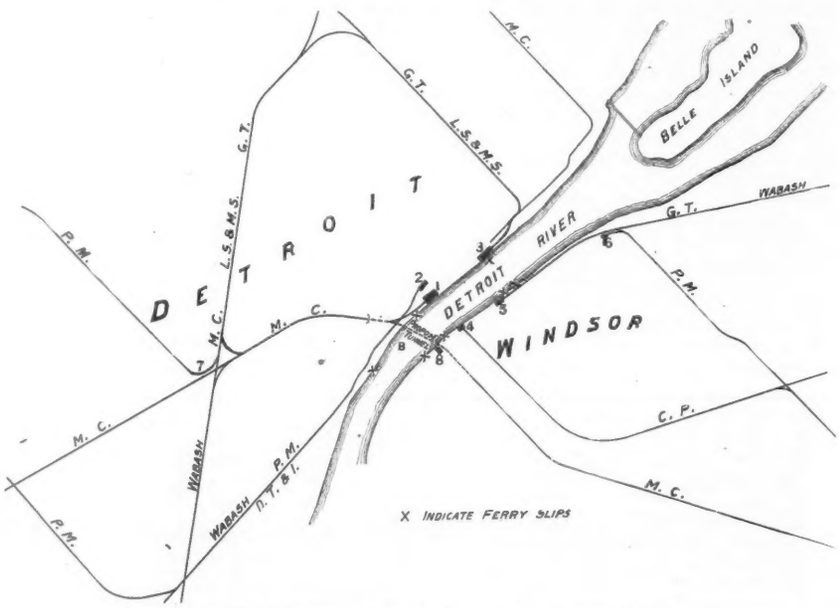
Design A may be briefly described as a method by which the pervious material underlying the river is replaced by an imperfectly water-tight mass of concrete placed under water, through which, without the use of shields, the inner tubes or tunnels proper may be constructed to secure water-tightness, continuity of strength and good workmanship, the whole work being done without the use of high air pressure or cofferdams. The following is an outline of the progressive stages of building the tunnels by this method:

A trench will be dredged in the bottom of the river, which is principally silt and firm clay, without rock or boulders, to the approximate dimensions shown on the drawings. It has been assumed that the slope of ½ to 1 will be sufficient for the purpose, but it may be necessary to use flatter slopes or put in sheet piling to maintain the approximate cross-section. "Two-men" stone will then be deposited over the bottom of the trench to a depth of 18 in. to form a blanket between the underlying clay or sand and the mass of concrete. On top of the loose stones 1:3:6 concrete will be laid to a thickness of 2 ft. The concrete will be machine mixed on barges or floating platforms, which will be moved progressively across the river as the work is completed. The tremie, bucket or bag method of depositing concrete under water, will be used for this work. After the concrete has set saddles supported on blocking and wedges will be laid on the concrete by divers to receive the tunnel forms. An alternative method will be to drive piles in the bottom of the trench and cut them off at the right elevation to receive the saddles, thus dispensing with the blocking and wedges.

The forms, built either of timber or steel, will be built on shore in convenient lengths of from 50 to 500 ft., floated into position, and sunk in their proper place on the saddles before described. When they are placed, the remainder of the concrete will be deposited entirely surrounding the forms and filling the excavated trench to the level of the river bottom. The adjacent sections of the forms will either be joined under water so as to make water-tight connections or an open space will be left between them to be filled with concrete forming a solid bulkhead to be cut out later when the tunnel lining is put in.

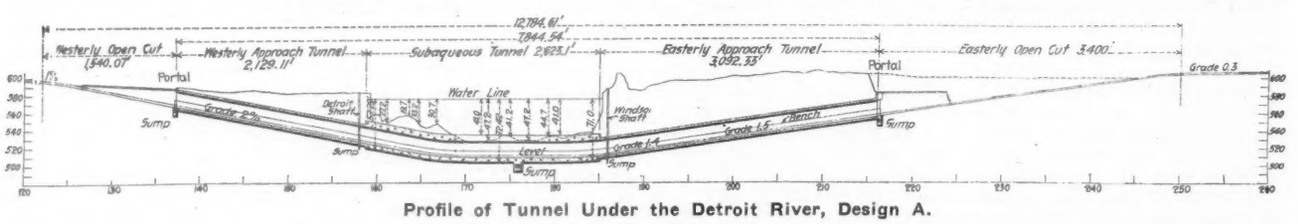
After the concrete surrounding the forms has thoroughly set the water will be pumped out of the first section and if the leakage is excessive sufficient air pressure will be put on to enable the forms to be removed, the waterproofing applied and the inner tube or tunnel lining to be put in place. If the forms are made of rolled steel they will be built with water-tight joints and left in the work to act as additional waterproofing on the outside of the inner tubes. If the forms are made of wood, waterproofing will be laid on the exterior and allowed to remain on the inside of the concrete shell when the forms are removed. This will require high air pressure to prevent hydrostatic pressure from distorting the waterproofing. When each section has been made water-tight the inner lining of reinforced concrete will be put in and the tunnel and tracks completed.

The specifications give the contractor the option of using steel or wooden forms for the tunnels. If steel forms are used they will have to be strongly braced internally to prevent distortion in floating to place and after the water has been pumped out preparatory to putting in the inner tubes. When sinking them in place pumps can be used to equalize the water pressure inside and out, and it is expected that lengths up to 500 and 600 ft. can be successfully floated and sunk. Convenience in handling, however, may make it desirable to use shorter lengths. Provision has been made in designing the inner tubes for a variation of 3-in. in the aline-

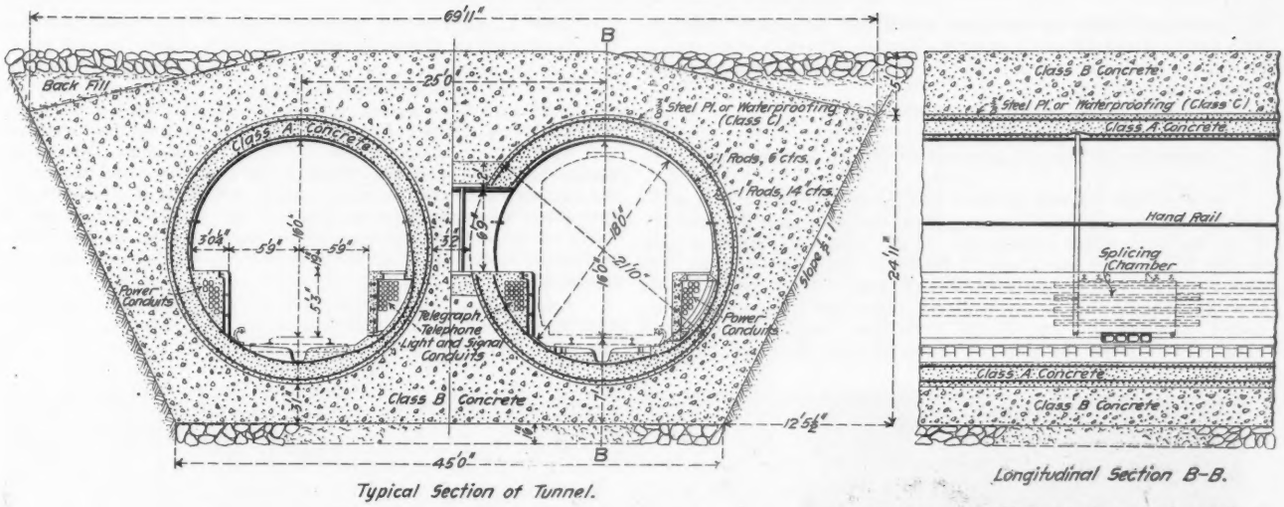


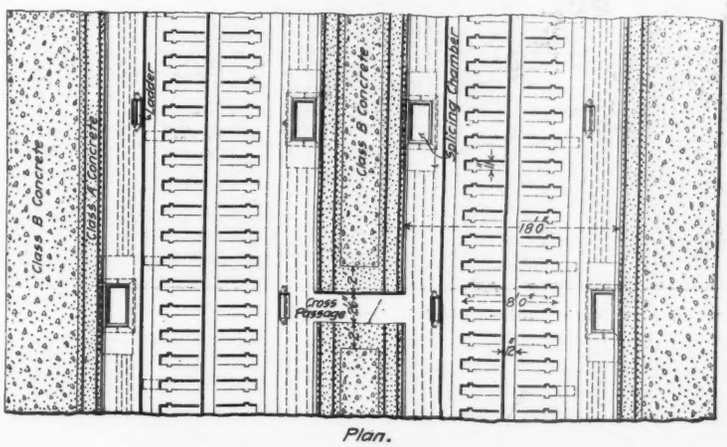
Sketch Map of Railroad Terminals in Detroit and Windsor.

1. *Michigan Central, Third Street Depot.*
2. *Union Depot, Wabash, Pere Marquette, Detroit, Toledo, & Ironton, Canadian Pacific.*
3. *Brush Street Depot, Grand Trunk, Lake Shore & Michigan Southern.*
4. *Windsor Depot, Canadian Pacific.*
5. *Windsor Depot, Grand Trunk, Wabash.*
6. *Windsor Depot, Pere Marquette.*
7. *West Detroit Junction.*
8. *Windsor Depot, Michigan Central.*



Profile of Tunnel Under the Detroit River, Design A.





Details of Tunnel Construction, Design A.

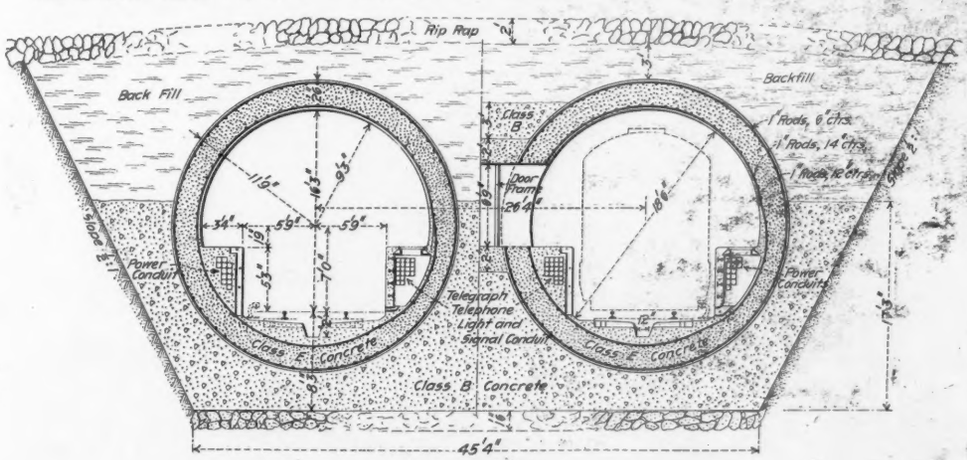
ment of the sections in case the cradles are not accurately set. The forms are to be provided with grouting holes and screw plugs at frequent intervals to permit filling any voids in the concrete surrounding the tubes. If concrete bulkheads are not used temporary steel bulkheads will be put in the forms before they are sunk to prevent flooding when the water is pumped out by reason of defects in the forms or joints of adjacent sections.

The interior lining will be 23 in. thick of 1:2:4 concrete reinforced with longitudinal and circumferential rods, 1 in. in diameter. The longitudinal rods will be spaced 14 in. center entirely around the tube being placed just inside the two rings of circumferential rods. These latter will be spaced 6 in. center to center, and 3 in. in from the inner and outer faces of the tube. The inside diameter of the tubes will be 18 ft., with 16 ft. clear height from top of rail. A bench 3 ft. ¼ in. wide and 5 ft. 3 in. above the top of rail will be formed on each side of the tubes, and the power, telegraph, telephone, signal and lighting wires will be laid in conduits built into those benches. The vertical faces of the benches will be reinforced with old rails, laid longitudinally. A clearance of 11 ft. 6 in. is provided for between the benches, which is well outside the maximum equipment clearance line.

The track construction is designed to give perfect drainage and to prevent creeping of the rails. The floor of the tunnel has a gutter 1 ft. 3 in. deep and 2 ft. wide in the center which slopes to the sump near the middle of the river. Recesses are formed in the floor to receive the cross-ties on which the rails rest. The New York Central standard type of under-running third-rail will be used in the tunnel. Other details of the design are clearly shown on the drawing.

Design B differs from Design A in that the inner tubes are made in sections complete, on the shore, floated into position, sunk on the cradles previously laid on the concrete bed and then joined with strong and water-tight joints before the surrounding mass of concrete is deposited. Backfilling will then be deposited over the tubes and around the mass of concrete and the top of the filled-in trench covered with rip-rap. Design C differs from Design A only in the details of the steel forms to be used and the steel reinforcement in the inner lining.

Dredging the tunnel trench will be carried on day and night to complete the work as soon as possible. Part of the dredged material is to be retained for backfilling on top of the concrete before the rip-rap is placed. The remainder will be loaded on scows and dumped either opposite Belle Isle in the main channel near the Michigan shore, or inside a new bulkhead at the foot of 12th street, where a tract of land along the river bank is to be reclaimed.



Cross-Section Through Tunnels, Design B.

The advantages claimed for the trench method over the shield method are: Reduction in lift of traffic owing to the higher level at which the tunnel can be built; saving in time of construction; minimizing risks; and large saving in first cost. The reduction in lift of traffic amounts to more than 8 ft., although a tunnel built with the shield method would have no heavier grades than one built by the trench method. The grade would simply be continued farther into the tunnel. Because of the thin layer of mud over the shield, driving the tunnel by this method would involve considerable risk of blowing out and flooding which would endanger life and might greatly delay the work. The very favorable nature of the river bottom insures little difficulty in dredging the trench and as the concrete work can be put down in large masses uninterruptedly the work should progress rapidly when once under way.

The enormous traffic on the river would not be greatly interfered with by the dredging and concreting barges. There is every reason to believe that the tunnel can be built by this method safely, quickly and cheaply.

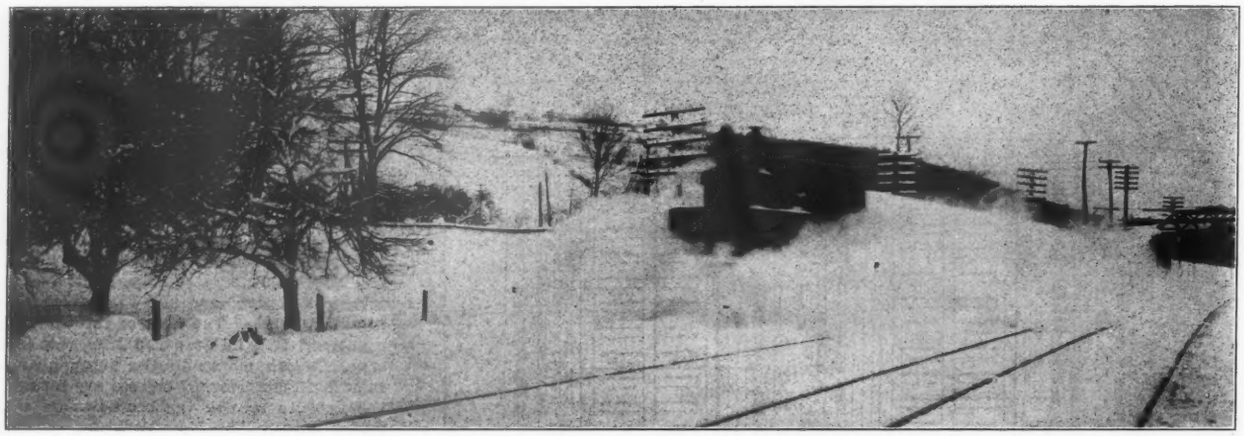
(To be continued.)

Operation of Electric Locomotive During a Snowstorm.

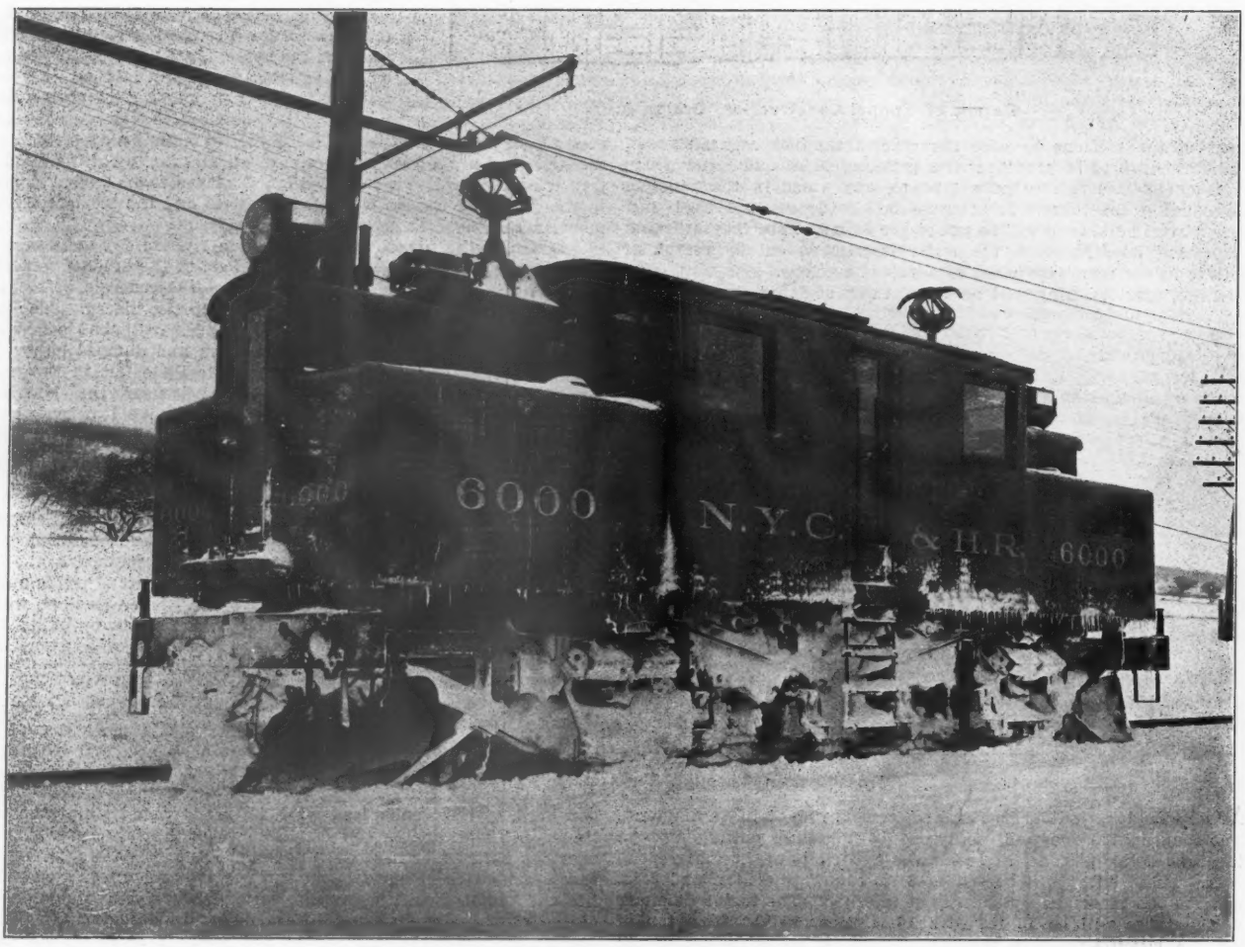
On February 9 a very unusual and interesting test of one of the New York Central's electric locomotives was made near Schenectady, N. Y., during a severe snowstorm. At the time the locomotive went on the track there was about 13 inches of snow between the rails. The protected and unprotected over-running rails were both completely covered, and in some places there was from four to six inches of snow on top of the protection boards. The flanger plow used to clean the snow out from between the track rails did not throw it clear of the third rail, and it was found that from the standpoint of third-rail operation much better service on the over-running rail would have been got without the plow.

The report which follows is arranged by paragraphs, topically, with reference both to the results obtained from the locomotive and from each of five types of third-rail protection (including also the unprotected type). These third-rail protection devices are shown herewith, and the stippled part of the drawing around the rail shows where the snow located and made the most trouble. One thing was demonstrated clearly—that a third-rail entirely unprotected is a good deal less troublesome in a snowstorm than a third-rail protected in such a way that snow is encouraged to accumulate.

Over-Running Rail, Unprotected.—Very little flashing, or trouble, was experienced on the first trip of the locomotive. On the following trips conditions grew worse, due to the fact that ice had formed



Snow Test of New York Central Electric Locomotive.

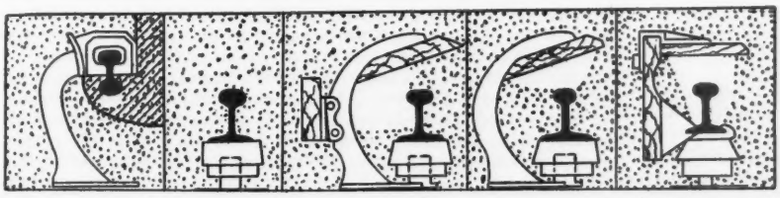


Elevation of Locomotive, Showing Flangers.

and the snow had become ironed out by the shoes. The unprotected over-running rail finally became so bad that it was almost impossible to run over it.

Over-Running Rails, Protected.—The service of these rails was not much better than the bare rail; in fact, in some cases it was probably worse. The wings of the snowplow would throw about enough snow to keep the top of the rail covered.

Under-Running Rail.—The locomotive left the barn at 10:30 a. m., as stated, and at 2 p. m. it began operation on the long stretch of under-running rail. Except in a single instance, there was practically no trouble. This exception occurred at the west end of the line, where there are two short lengths of this rail installed. The long stretch between the under-running rail at the Fonda, Johnstown & Gloversville station and the West Crossing gives the shoe a chance to fill up with snow and ice, so that when the top contact surface of the under-running shoe strikes the rail there is a chance of the circuit being broken. After the locomotive had made one trip over the under-running rail, the snow was scooped from under the contact surface for 2½ or 3 inches; and, unlike the over-running rail, each passage of the locomotive would tend to clean off the surface of contact.

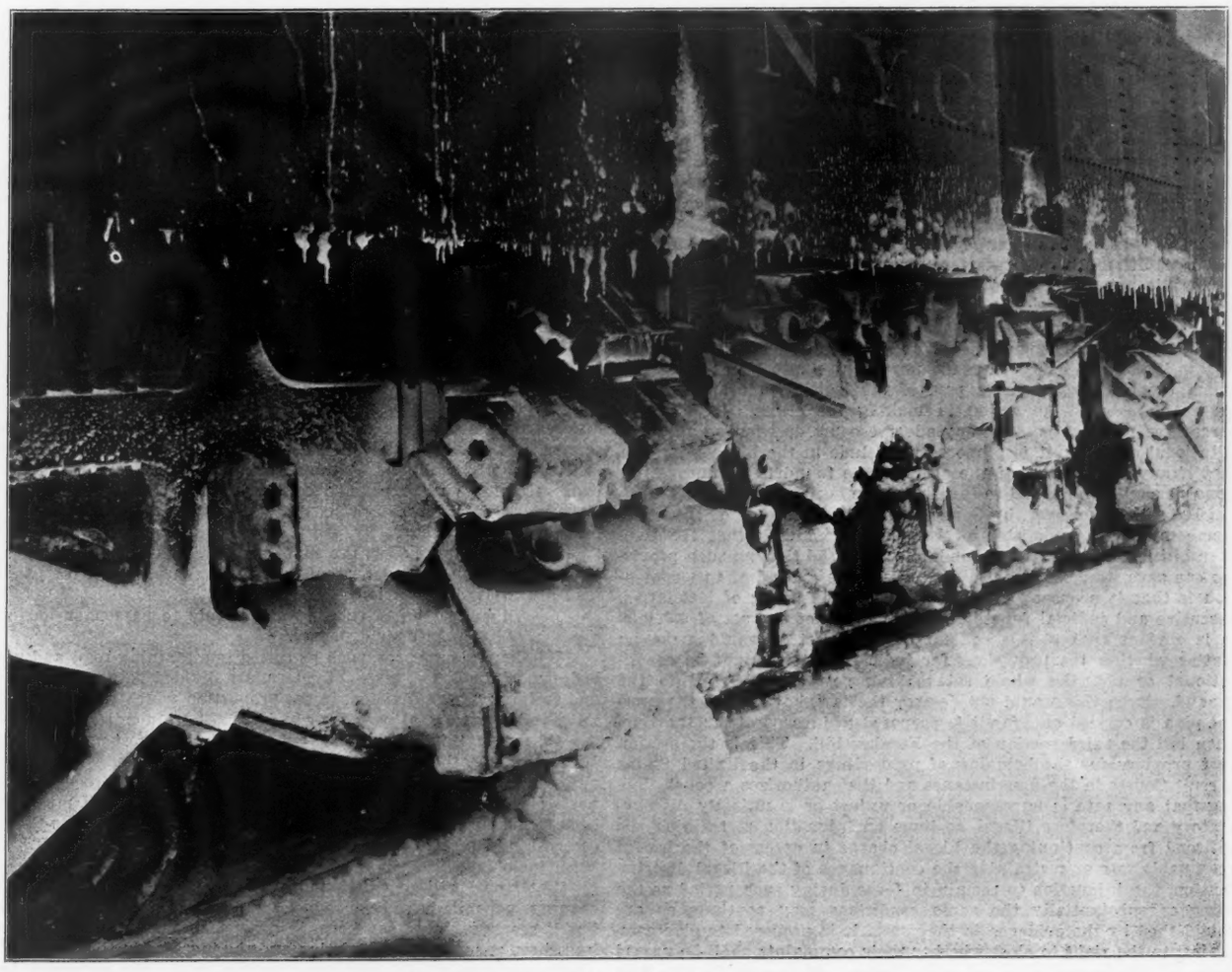


Condition of Five Types of Third Rail After Passage of Flanger.

After an inspection lasting all the afternoon, it was agreed that the conditions under which the locomotive was operating were more severe than in regular service because no flangers were being run over the line; also, that the snowplow at present used on the locomotive can be improved; that the operation of the shoe on the under contact rail is much more satisfactory than on the other types, and that the rail is much easier to keep clean. The under-running rail, to which reference is made, is the one which we have previously shown in the *Railroad Gazette*, which was designed and patented by Mr. Wiigus and Mr. Sprague, and was further developed by Mr. Katte.

The report as presented on general conditions shows that the snow began falling February 9 at 1:30 a. m., and stopped at 2 p. m.; that its character was medium heavy, average depth 17 inches; drifting, none; flanger over road on tracks Nos. 1 and 3 at 12.30 p. m. Effect of flanger on under-running third rail: flanger on track 3 packed the snow hard against the rail, but after the first passage of the locomotive the snow was cleared away for a distance of 2½ or 3 inches beneath the rail, as shown by the heavy line in the drawing. On the unprotected rail of the over-running type the effect of the flanger was minimized, since the rail was on the far side of the track so that the flanger on track 3 made little difference. The first trip of the locomotive over the unprotected rail caused less trouble than succeeding trips, for the reason that the arcing of the first passage melted the snow and formed ice, which made conditions much worse on subsequent trips. The over-running third rail of the New York Central type, protected top and side (Fig. 3), suffered no ill effect from the flanger, since it was too far away; but after the passage of the locomotive the effect was the same as with the bare rail; that is to say, there was a tendency to iron down the snow on top of the rail and to form a layer of ice. Fig. 4 shows the New York Central third rail of the top protected type. This suffered no bad effect from the operation of the flanger, but it was almost impossible to run over the rail after a few trips. The type of the snowplow used on the locomotive was chiefly responsible for this. The rail of the inner running type, shown in Fig. 5, was packed about more tightly with snow by the flanger than were the others. The shoe on the locomotive arced badly in running over it, but not as badly as on the New York Central over-running protected types.

When the locomotive was laid up again at 6 p. m., after having



View of Frame and Motors After the Test.

been on the road for eight hours, the snow was packed around the commutator and brush holder, but there was very little on the armature. About 10 inches of snow clung to the bottom side of the armature and commutator screws. There was no sign of motor trouble which could be attributed to the snow.

Operation of Shoes.—The enclosed third-rail shoe stops took care of the snow very well. There was no indication of trouble occasioned by the snow preventing the shoes from turning on their axles. This was one of the sources of trouble in the experiments made last winter. The shoes, however, arced badly, both on the protected and on the unprotected over-running rail. The arcing on the under-running rail was very much less.

While the trials were being made, the snow fell, during the morning, at an average rate of three inches per hour.

Washington Correspondence.

WASHINGTON, Feb. 13.—Rapid progress is being made by the Senate Committee on Interstate Commerce with the preparation of the railroad rate bill to be reported to the Senate. The speech delivered on Monday by Senator Lodge, of Massachusetts, has done much to clear the air. While Mr. Lodge did not assume to speak for the President, and it is clear that his views as to the unwisdom of any provision for fixing transportation charges by governmental authority are certainly not concurred in by the President, there is no doubt in the minds of Senators that in the part of his speech dealing with the question of judicial review, Mr. Lodge expressed the views of Mr. Roosevelt. It is significant, therefore, that Mr. Lodge declared that the President's message recommending that the Commission be given authority to fix rates "subject to review by the courts" contemplated that the courts should be empowered "to determine, not merely whether the rate established by the Commission is confiscatory, but whether it is lawful, just and reasonable."

As a result of conferences with Senators, after Mr. Lodge had made his speech, Senator Elkins, chairman of the Committee on Interstate Commerce, introduced his revised bill to-day and will ask the committee to consider it to-morrow. He has expressed confidence that it can be reported from the committee and be passed by the Senate, but, in the opinion of other Senators this is hardly possible. It is known that the President is anxious to have the Hepburn bill made the basis of the action of the Senate, and there is little doubt that this will be done, but when it is reported from the committee it will be very unlike the Hepburn bill that passed the House. The present plan is to retain the language providing for the fixing of a rate by the commission, but to insert a provision for a judicial review that will give the courts jurisdiction, not only of the question of whether or not the rate made by the commission is reasonable and just, but to go back of the order of the commission and pass upon the question of the reasonableness and justice of the rate that had been complained of. There will be no express provision authorizing the court to suspend the order pending review nor any provision attempting to interfere with such suspension.

In the opinion of some of the lawyers of the Senate it will be very difficult to frame such a review provision that will be constitutional, their theory being that an order of the commission fixing a future rate is a legislative act and that the courts can neither review it after it has been made nor inquire into the grounds on which the commission—as a part of the legislative branch of the government—based its action in making the order. In order to narrow, as much as possible any adverse court decision on any constitutional question, it is proposed to include in the bill a provision that if any one feature of the act shall be found to be unconstitutional it shall not be held to invalidate the entire act.

It is held, however, by Senator Foraker and some of the other members of the Committee on Interstate Commerce that the Hepburn bill is unconstitutional fundamentally, and that no such provision can save its most essential features. The ground of this contention is that it proposes an unconstitutional blending of legislative, executive and judicial functions in the hands of one set of officials. It is obvious that if this contention is correct it would make no matter whether the provisions for judicial review might be constitutional or not, the whole rate-making power would fall to the ground. Even this would not destroy the law, however, if the present plan is carried out, for it is proposed to incorporate in the Hepburn bill the third section of the Foraker bill. This is the section that provides for the bringing of proceedings in the United States Circuit Courts in the first instance and that authorizes a court, finding that any rate is unreasonable or unjust or is unjustly discriminatory and therefore illegal, to issue an injunction restraining the railroad from continuing the illegal charge in excess of the lawful reasonable rate or restraining the continuance of the illegal discrimination, the injunction to remain in force during such period as the same or substantially the same conditions may continue as are established by the evidence in the case. It is proposed to give complainants the right to elect whether their complaints shall be passed upon by the commission or taken before the courts in the first instance. In addition to affording this alternative method of procedure it is expected that the incorporation of this provision from the Foraker bill will make it certain that the courts will leave some kind of effective legislation on the statute books and will not destroy the whole act. There seems to be no doubt now as to the bill being reported by a majority of the committee, for, even if Senator Dolliver and Senator Clapp should refuse to unite with their Republican associates it is understood that at least two Democrats—Senator McLaurin and Senator Foster—will vote for the amended bill. The revised Elkins bill also includes the third section of the Foraker bill, so that whatever may be done by the committee, it is practically certain that the bill reported will contain a provision for an alternative procedure before the courts.

A general investigation by the Interstate Commerce Commission into the relations between the railroads and the bituminous coal industry seems to be assured by the unanimous adoption by the Senate of the Tillman joint resolution directing such an investigation. The resolution is now before the House Committee on Interstate and Foreign Commerce, and there is little doubt that it will be reported and adopted by the House. It calls for complete information as to the interests of railroads and railroad officers in the mining of bituminous coal, as to whether there is a combination, in the form of a trust or otherwise, in the bituminous coal industry, as to how the relations of the railroads and their officers, and any combination that may exist, operate on independent producers, and as to whether there is discrimination against independent producers in the matter of car supply or in any other way. The Commission is required to report any remedy that it can suggest for any of the enumerated evils that may be found to exist, and also to report any facts or conclusions that it may think pertinent to the inquiry. J. C. W.

Required Reduction of Passenger Fares in Ohio.

Mr. James McCrea, First Vice-President of the Pennsylvania Lines West of Pittsburg, has submitted to the Ohio Committee on Railroads and Telegraphs a full discussion of the passenger business done by his company, as an argument against the enactment of any law fixing the maximum rate which railroads may charge for transporting passengers within the State of Ohio at two cents a mile. A portion of this document follows:

Exhibit "A" shows the earnings per passenger per mile and per passenger train mile for each of the different roads embraced in the Pennsylvania System West of Pittsburg for the year 1904; and I beg to call your attention to the fact that twenty out of the thirty-two roads show a loss upon every passenger carried. The passenger train earnings include the earnings from mail, express and baggage; and yet eleven out of thirty-two lines show an actual average loss on every passenger train hauled.

Exhibit "B"* shows the passenger mileage, earnings, expenses, and averages on passenger business from 1871 to 1904, inclusive, on Pennsylvania Company lines (Northwest System), and from 1890 to 1904 on The Pittsburg, Cincinnati, Chicago & St. Louis Railway Company lines (Southwest System). The rate received has decreased from a maximum of 2.83 cents on the Pennsylvania Company lines in 1873, to 2.02 cents in 1904, while the expenses have increased from 1.89 cents in 1873 to 2.13 cents. On the P., C. C. & St. L. Ry. the rate received has decreased from 2.30 cents in 1890 to 1.94 cents per passenger per mile, while the expenses per passenger per mile have decreased from 2.13 cents to 1.93 cents, leaving a margin in the year 1904 of only one-tenth of one mill per passenger per mile. The difference in the cost on the Northwest System, 2.13 cents per passenger per mile, and that on the Southwest System, 1.93 cents per mile, is wholly explained by the difference in the number of limited express trains with expensive equipment and high speed. On the Fort Wayne road there are six daily trains of this character, while on the P., C., C. & St. L. Ry. there are only two per day.

At this point it seems proper to me to give an explanation as to how the expenses in connection with the transportation of passengers are arrived at. Briefly—

A—All known items relating exclusively to passenger business are charged to passenger expenses.

B—General expenses, such as cost of maintaining road and roadbed, superintendence, taxes, et cetera, are divided between passenger and freight on each division, in the proportion which passenger train mileage bears to total passenger and freight train mileage.

Of course, this is arbitrary, but the rule is almost universal, and I know of no other basis that has so many arguments in its favor and which seems so absolutely reasonable. Should there be any imperfections in this method of dividing these expenses, it must have been a constant one, and therefore there can be no doubt as to the correctness of the ratio showing the increased cost as between 1873 and 1904, inclusive.

Later on I will go a little more into detail as to the reasons why earnings per mile have been reduced and expenses per mile increased, but it seems right to say here, in a general way, that the earnings have been reduced by competition and the increase in the use of mileage, commutation and excursion tickets, while the expenses have

*Not shown in this abstract.—EDITOR.

been increased because of higher standards for track and equipment and greater weight and speed of trains.

Exhibit "C" shows the passenger statistics for all Pennsylvania Lines for the state of Ohio, as well as for the Pennsylvania Company, P., C., C. & St. L. Ry., the Vandalia Railroad, and the G. R. & I. Ry. Cos. Columns 13, 14 and 15 show the earnings and operating cost, with profit or loss on all passenger trains, and the earnings include the earnings of passenger, mail, express and baggage. I prefer to treat the subject from this standpoint rather than from that of the earnings, expenses and profits per passenger per mile, as shown in columns 9, 10 and 11, because the criticism has been made that by showing only the earnings from passenger fares an attempt has been made to deceive the public. I think a little consideration will make plain to anyone not only the difficulty but the illogical results that would be produced by attempting to apportion the mail and express earnings on the basis of the passengers carried one mile.

In the earnings of passenger trains is included $498,787, on account of mail and a large proportion of the earnings from express covering traffic that was carried on exclusive mail and express trains and upon which no passengers were handled. Had the operations of these trains been excluded, the average earnings per passenger train mile would have been considerably reduced and the net result affected accordingly.

I would draw particular attention to column 16 of this statement, in which you will find the passenger train proportion of fixed charges and dividends on capital stock, per passenger train mile. I presume no one will dispute the propriety of the passenger traffic (including mail and express) bearing its fair and proper share of the fixed charges and reasonable dividends to the stockholders for the capital invested in the property. When these charges are provided for, the Pennsylvania Company lines in the state of Ohio show a loss of nearly 16 cents per passenger train mile, the P., C., C. & St. L. a loss of over 3 cents per passenger train mile, the Little Miami over 15 cents, and all Pennsylvania Lines in the state of Ohio a loss of almost 11 cents per passenger train mile, while the results on all of our lines, including those outside of the state of Ohio, are as follows:

Pennsylvania Company	.03462 cents	loss.
P., C., C. & St. L. Ry.	.03867 "	profit.
Vandalia Railroad	.19071 "	"
G. R. & I. Ry.	.03450 "	"

In studying the results shown in column 17, please take into consideration the information which I will give you later in regard to the average number of passengers carried per train mile in the state of New York as compared with the state of Ohio. In the former state they average 61 passengers per train mile, while in Ohio the average is 48, or a difference of 13 passengers, which at 2 cents per mile would have added to the net profits of operation 26 cents per train mile, or enough to have eliminated the deficit and left a surplus of over 15 cents per passenger train mile on all Pennsylvania Lines in the state of Ohio. Of course, I know that the advocates of the measure under consideration by your committee will charge that these unprofitable results are partly due to over-capitalization on the part of the railroads. Some of you are no doubt aware that the leases under which the Pennsylvania Company operates the P., F. W. & C. Ry.; the C. & P. R. R., and other properties, were made thirty years or more ago, at a time when the rate of interest was much higher than at present, and it therefore pays a rental of 7 per cent. on the stock of most of these companies. The actual capitalization per mile is not high, but at the time at which the leases were made, what was a fair rate of interest has become in some instances burdensome. So far as the Pennsylvania Company stockholders are concerned, with an investment of $40,000,000, they received in 1904 a return of 5 per cent., but in many previous years they received nothing whatever, because the income was devoted to capital expenditures without any increase in capital.

The stockholders of the P., C., C. & St. L. Ry., with a capital stock of $52,000,000, received in dividends during the year 1904, $1,841,511.50, or less than 4 per cent. Outside of this small return to the people who invested so much money in these properties, and the interest on the bonded debt, every dollar expended has gone back to the public in payment either of wages to employees or for materials for the operation and improvement of the road; and right here I desire to say that for every dollar represented in the capitalization of the Pennsylvania Lines in the state of Ohio, an actual dollar has been invested; that the property cannot be reproduced for the same capitalization; and that the return on the capital so invested is less than for any other character of business; and as proof of this assertion I would refer you to the statistics of the Interstate Commerce Commission, from which the following statement is made up; the figures covering the railroads are taken from the report for 1903, while those in regard to manufactures and agriculture are from the census reports of 1900:

In making up the figures for manufactures 60 per cent. of net revenue is set aside for interest and dividends and 40 per cent. for surplus to cover depreciation, etc. In agriculture the taxes are estimated at 1 per cent. on the valuation. It will be seen from these figures that if a man had $1,000 which he desired to invest in three industries in the United States—steam railroads, manufacturing and agriculture—in the same ratio as investments in such have up to the present time been made he would place in:

Railroad—stocks and bonds	$276
Manufacturing	235
Agriculture	489

The gross earnings from these investments, according to returns of Interstate Commerce Commission reports for 1903 and census reports of 1900, would be from:

		Per cent.
Railroads	$46.00	16.8
Manufacturing	310.00	132.1
Agriculture	106.00	21.8
Totals	$462.00	46.2

Of the above gross earnings there would be expended on account of cost of operation, including labor, material, taxes and incidentals:

		Per cent.
Railroads	$33.00	12.2
Manufacturing	265.00	112.8
Agriculture	37.00	7.6
Totals	$335.00	33.5

There would remain for interest and dividends:

		Per cent.
Railroads	$10.70	3.75
Manufacturing	26.90	11.62
Agriculture	58.40	12.05
Totals	$96.00	9.60

Amount to be carried to surplus for renewals and depreciation:

		Per cent.
Railroads	$2.35	0.85
Manufacturing	18.10	7.65
Agriculture	10.55	2.16
Totals	$31.00	3.10

If he had invested all of the $1,000 in railroad stock and bonds his net returns would have been: From interest and dividends, $37.50; surplus, $8.50; total, $46. If all had been invested in manufacturing his returns would have been: From interest and dividends, $116.20; surplus, $76.50; total, $192.70. If he had invested all in agriculture his profits would have been $120.50; surplus, $21.60; total, $142.10.

In other words, it is shown that if a man invests in manufacturing he will, on an average, receive $4\,^{2}/_{10}$ times as great a return, and if he invests in agriculture he will receive $3\,^{1}/_{10}$ times as great a return as if he had made his investment in railroads.

Here let me speak of a very important feature in connection with the transportation problem, which is seldom referred to in the public prints and which I do not believe is generally thought of, although the truth of it, I think, will easily be recognized when your attention is called to the matter; and that is, that to serve the public well and as they have a right to demand, transportation companies must expend large sums of money in increasing their facilities. The only way in which this capital can be obtained is by

A. Taking it out of the income from operations;
B. The sale of stock; or
C. The sale of bonds.

There are always expenditures to be made which cannot be expected to yield a return equivalent to the interest on their cost, as for example the separation of the grade between railroads and highways, and many other improvements that add to comfort, convenience and safety, and a large part of these expenditures must be taken from income; and unless the transportation companies can show a surplus so invested over and above that which is necessary to pay interest on its debt and a fair dividend on its capital stock, the public will not buy additional stock or bonds that may be offered in the market, in order to provide additional facilities necessitated by growth of business; therefore it is necessary that the net profits of a railroad shall show a sufficient surplus over dividends to be convincing evidence to investors that the company will be able to pay its interest and dividends on such new obligations as are offered for sale.

The statement has been made by one of the advocates of the bill, that the average miles traveled by each passenger is: In France 21; in Germany 15, in Russia 65, in Austria 20, in Italy 28, etc., and that the rates for second class are: In France 2.32 cents, Germany 2.28 cents, Austria 2.34 cents, Russia 0.82 of a cent, etc., and this, together with the statement that the New York, New Haven & Hartford R. R., and some of the railroads within the state of New York were carrying passengers profitably at a rate of two cents per mile, was claimed to have proved the argument of the

	Amounts invested capital or value.	Per cent.	Gross: Income from operation annual amount.	Per cent. on capital invested.	Cost of operation including taxes.	Per cent.	Interest and dividends. amount paid.	Per cent.	Carried to surplus for depreciation and betterments.	Per cent.
Railroads	$11,582,289,186	27.62	$1,950,743,636	16.84	$1,416,509,017	12.24	$435,007,150	3.75	$99,227,469	0.85
Manufactures	9,835,086,900	23.46	13,014,287,498	132.12	11,109,101,894	112.85	1,143,111,362	11.62	762,074,242	7.65
Agriculture	20,514,001,838	48.92	4,471,019,160	21.81	1,556,530,621	7.60	2,471,315,124	12.05	443,173,415	2.16
Totals	$41,931,377,938	100.00	$19,436,050,294	46.20	$14,082,141,532	33.50	$4,049,433,636	9.60	$1,304,475,126	3.10

speaker, that a cheap fare means a longer ride, and therefore more money to the railroads. A careful examination of Exhibits "D" and "E" will, I think, thoroughly demonstrate that the conclusions reached are erroneous. It is not the cheap fare and the long haul that produces a net revenue to the railroad company, but *a full* train. It costs just as much for fuel, wages, repairs to and maintenance of equipment and track, taxes, interest, etc., to haul a train of six cars with twenty people in it, as it does to haul the same train with one hundred people. The New York, New Haven & Hartford R. R. received but 1.7 cents per passenger per mile last year, but it handled the largest number of passengers per mile of road (31,163) and per passenger train mile (77) of any road in the country, while its average haul per passenger was very low, being 18.5 miles.

In Exhibit "E," Group 1, you will note the average number of passengers per mile of road in New England was 15,704, average haul 17.5 miles and the average rate, 1.79. Group 2 includes the Middle States, and the average passengers per mile of road dropped to 10,651, while the rate increased from 1.79 cents to 1.89 cents, and the average haul per passenger from 17.5 to 22.5 miles; while in Group 3, which includes Ohio, Michigan, Indiana, Illinois and Wisconsin, the average number of passengers per mile of road dropped to 2,385, the rate increased from 1.89 to 2.16 per mile, and the average haul increased from 22.5 to 38.4 miles.

By following the statements down through the different groups you will find that the average rate received, and the average haul per passenger, increases almost uniformly as the average number of passengers per mile of road (or as we call it, the "passenger density") decreases; when you reach Group 8, the passenger density increases and the rate and average haul drops. This is nothing more or less than a demonstration of the same law that governs all business transactions. A merchant may be forced by competition to sell 100 barrels of sugar at such a small margin, that when charged with its proportion of the general expenses, such as rent, wages, heat, lighting, etc., the operation will result in a loss; but he might sell 1,000 barrels at the same margin, and, by a wider distribution of the fixed charges, leave himself with a small profit instead of a loss.

You will note in Exhibit "D" that I have selected some of the principal roads in the different states. In New England the average number of passengers per train mile is 63; on the N. Y., N. H. & H. Railroad, which was selected as a Connecticut road, the average is 77 passengers per train mile; on the roads in the state of New York the average is 61 passengers per train mile; in Ohio the average is 48; Indiana, 54; Illinois, 49; Michigan, 42; the average for Ohio, Indiana and Illinois in the year 1904 being abnormally swelled by the travel to the World's Fair at St. Louis.

I might elaborate this question of the effect of densely populated districts upon the profits in the transportation of passengers, but I think it is sufficient to refer you to Exhibits "D" and "E" and say that when the density of travel in Ohio equals that of New York and Connecticut I think you will find that the railroads will no longer oppose a similar service at a similar price.

While the average rate received per passenger has, by reason of the increase in commutation travel, excursion business, the use of mileage tickets, reduced rates to conventions, clergymen, etc., been decreasing, every element that enters into the cost of doing the work, both with respect to labor and materials, has been increasing. Passenger locomotives which ten years ago cost $9,000, to-day cost $18,000; passenger coaches which could then have been purchased at $6,000, now cost over $9,000. Both wages and the price of fuel, two very important items, have advanced; competition has resulted in the introduction of dining cars, cafe cars, observation cars, and fast schedules, while the steady growth in the number of people to be cared for has necessitated the construction of expensive terminal stations; and last, but not least, has been the increase in taxation, all of which have added greatly to the cost of handling the business, and I venture the assertion, based upon practical experience in this country and upon personal observation abroad, that no railroads in the world give better or cheaper service, conditions considered, than is given by the lines which traverse the state of Ohio.

According to the speaker who addressed your committee last Wednesday evening, the first-class fares in Great Britain are 2.94 cents, in France 3.4 cents, in Germany a fraction over 3 cents; the second-class fares in Great Britain 2.46 cents, in France 2.32 cents, and in Germany 2.28 cents; and third-class fares in Great Britain 2 cents, in France 1.5 cents, and in Germany 1.5 cents. The rate received on the P., C., C. & St. L. Railway for the year 1904 was 1.95 cents, and on the P., F. W. & C. Railway 1.96 cents; in both cases less than the third-class fare in Great Britain, and but little more than the third-class fare in France and Germany.

The gentleman referred to says that he does not know the character of equipment furnished with third-class tickets, but I am not only familiar with it but have no hesitation in saying that we would not be permitted to use on the Ohio roads cars equipped like the third-class cars in European countries.

It is impossible for anyone to form a correct judgment of any business proposition without a thorough knowledge of all the facts in connection with it, and therefore it follows that it is impossible for the average citizen to form an intelligent or just opinion as to what is an equitable charge for transportation because they cannot

Pennsylvania Lines West of Pittsburg.

Average Passenger Earnings, Expenses, and Net Earnings Per Mile, and Per Train-Mile, Year Ending Dec. 31, 1904.

	Per passenger per mile— 1. Earnings, cts.	2. Expenses, cts.	3. Net, cts.	Per passenger train per mile— 4. Earnings. cts.	5. Expenses, cts.	6. Net, cts.
Pitts., Ft. Wayne & Chic. Ry.....	1.98	2.06	0.08*	112.9	85.0	27.9
Massillon & Cleveland R. R.	0.91	0.38	0.53	.....	.....	.....
New Castle & Beaver Valley R. R.	2.64	1.32	1.32	144.8	63.2	81.6
Pitts., Youngstown & Ashtabula..	2.37	3.35	0.98*	76.3	77.7	*1.4
Erie & Pittsburg R. R.....	2.31	2.62	0.31*	84.4	83.9	0.5
New Castle Branch, W. N. Y. & P.	2.57	2.60	0.03*	82.9	77.6	5.3
Cleveland & Pittsburg R. R.	2.08	2.13	0.05*	127.4	108.5	18.9
Pitts., Ohio Val. & Cincinnati R.R.	2.75	7.82	5.07*	105.3	242.7	*137.4
Toledo, Walhonding Val. & Ohio..	1.68	2.16	0.48*	75.8	79.1	*3.3
South Chicago & Southern R. R...	1.22	3.32	2.10*	32.3	80.5	*48.2
Cleveland & Marietta Ry.	2.33	2.25	0.08	107.0	90.4	16.6
All lines operated directly by Pennsylvania Company .	2.01	2.13	0.12*	109.0	87.1	21.9
Pitts., Cin., Chic. & St. Louis Ry.	1.96	1.94	0.02	124.4	90.3	34.1
Little Miami R. R.	1.76	2.01	0.25*	102.9	89.0	13.9
Chartiers Railway	1.99	1.45	0.54	154.2	101.6	52.6
Pitts., Wheeling & Kentucky R. R.	2.41	2.05	0.36	140.8	104.9	35.9
Indianapolis & Vincennes R. R....	2.34	2.06	0.28	100.1	76.0	24.1
All lines operated directly by P., C., C. & St. L. Ry. Co.	1.95	1.94	0.01	121.4	90.1	31.3
Grand Rapids & Indiana Ry.	2.07	1.80	0.27	111.1	85.1	26.0
Muskegon, Grand Rapids & Ind...	1.33	1.43	0.10*	114.7	100.0	14.7
Traverse City R. R.	2.36	2.88	0.52*	68.0	67.3	0.7
Cin., Rich. & Ft. Wayne R. R....	2.41	2.46	0.05*	113.1	98.0	15.1
Cin. & Muskingum Valley R. R....	2.17	2.62	0.45*	58.6	59.4	*0.8
Waynesburg & Washington R. R..	2.78	2.59	0.19	115.0	91.9	23.1
Pitts., Chartiers & Youghiogheny.	2.26	3.90	1.64*	28.9	45.1	*16.2
Cleveland, Akron & Columbus Ry.	1.72	1.76	0.04*	92.6	79.0	13.6
Cincinnati, Lebanon & Northern..	1.21	2.81	1.60*	39.1	75.3	*36.2
Toledo, Peoria & Western Ry.....	2.44	2.26	0.18	100.9	81.3	19.6
Central Indiana Ry.	2.68	6.00	3.32*	32.2	53.3	*21.1
Terre Haute & Indianapolis R. R.	1.68	1.37	0.31	153.1	95.5	57.6
St. Louis, Vandalia & Terre Haute	1.83	1.29	0.54	154.4	82.7	71.7
Terre Haute & Logansport Ry. ...	2.00	2.19	0.19*	75.1	73.1	2.0
Logansport & Toledo Ry.	2.14	2.96	0.82*	64.0	74.3	*10.3
Terre Haute & Peoria R. R.....	2.40	3.78	1.38*	60.7	82.7	*22.0
All lines operated under their own organizations	1.94	1.77	0.17	108.6	81.5	27.1

*Loss.

20 roads show net loss per passenger per mile; 12 roads show net earnings per passenger per pile. Note.—The reason that in some cases a loss is shown per passenger mile and a profit per passenger train mile is because the earnings per passenger train mile include mail and express.

Passenger Statistics of Pennsylvania Lines.

	In the State of Ohio, June 30, 1905, Grand totals.	Pennsylvania Lines West of Pittsburg. Year ending Dec. 31, 1904. Penn. Co. Lines.	P., C., C. & St. Louis Ry.	Vandalia Railroad.	Grand Rap. & I. Ry.
1. Miles of road: Total	3,019.37	1,526.29	1,423.50	687.77	573.39
2. In Ohio	1,857.95	.....	.....	.....	.....
3. Gross earnings from passengers	$6,271,138.04	$5,681,551.44	$6,633,944.34	$2,417,339.23	$1,378,653.36
4. Number of passengers	10,592,528	10,292,763	10,415,946	2,879,671	2,051,703
5. Number of passengers carried 1 mile	327,360,042	281,141,008	341,936,459	131,452,964	66,408,713
6. Number of passengers per mile of road	5,701	6,744	7,317	4,187	3,578
7. Number of passengers carried 1 mile per mile of road..	176,194	184,219	240,208	191,129	115,818
8. Number of passengers per passenger train mile.....	43	41	47	54	46
9. Per passenger per mile: Earnings, cents.	1.916	2.021	1.940	1.839	2.076
10. Expenses, cents.	2.166	2.128	1.935	1.556	1.878
11. Profit or loss, cents.	L. 0.250	L. 0.107	P. 0.005	P. 0.283	P. 0.198
12. Passenger train mileage	7,587,071	6,896,674	7,307,522	2,448,584	1,435,515
Passenger train earnings—Pass., mail, exp. and baggage:					
13. Earnings, per train mile.	$1.09784	$1.08681	$1.21016	$1.25845	$1.09853
14. Expenses, per train mile	0.93443	0.80465	0.90528	0.83.36	0.86898
15. Net earnings, per train mile	0.16341	0.21916	0.30488	0.42309	0.22955
16. Proportion of fixed charges and div. per pass. train mile	0.27236	0.25318	0.26621	0.23238	0.19505
17. Net loss per passenger train mile.	0.10878	0.03402	P. 0.03867	P. 0.19071*	P. 0.03450

*The profit on the Vandalia Railroad is due to the World's Fair traffic in 1904; the results for 1903 show that the average number of passengers per train mile was 36, as against 54 in 1904, and the loss per passenger train mile was 10.142 cents.

Note.—In the earnings of passenger trains is included $498,787, on account of mail and a large proportion of the earnings from express covering traffic that was carried on exclusivel mail and express trains and upon which no passengers were handled. Had the operations of these trains been excluded the average earnings per passenger train mile would have been considerably reduced and the net result affected accordingly.

know all the facts concerning it; and the same reasoning holds good with respect to all the subjects of legislation; therefore, in a government of the people by the people, the people have selected representatives whose duty it is to meet together and carefully consider the questions involved when new laws or modifications of old laws are demanded, and consequently it is your duty as representatives of the people, before legislating on a subject of this magnitude, to make every effort to ascertain the whole facts of the case, and be guided in your recommendation and vote by such facts and conditions.

As one of the representatives of the largest taxpaying interests, the largest employers of labor, and the largest purchasers of materials, I have felt it my duty to appear before you and present the facts submitted, and ask that before coming to any conclusion you carefully consider them; have the statements checked by representatives selected by yourselves, with the sworn statements furnished under the requirements of the law and filed in the office of the Commissioner of Railroads and Telegraphs at Columbus, Ohio, and in the office of the Interstate Commerce Commission at Washington. Disinterested experts can always be found, and when legislation involving so much is before you for consideration, it seems to me that it is the duty of the representatives of the people to take the time and spend the money, if necessary, to enable them to obtain such information as will place them in a position to decide what is fair and equitable to all interests. If it is determined that a change is necessary, an effort should be made to see what adjustment can be reached between what is demanded and what the transportation companies feel they can fairly be asked to yield, and then prepare the law in such form as will make it bear with as little hardship as possible on the interests affected.

I have not undertaken to criticise in detail the bill that is now before you for consideration, because I am merely representing one of the transportation companies which serve the people of the state of Ohio, and because I sincerely trust that the effect of what I have said will be a careful study by your committee of this bill, through consultation with the experts of the other railroads, and other experts that you deem it proper to employ, to check and verify arguments presented, so that in the end both the public and the railroads will feel that they have been properly treated. This is a course that has always been followed by Congress, members of state legislatures here and elsewhere, and by the representative bodies of countries with whose rates ours have been compared, so that the practice has almost become an unwritten law; and surely it seems to me not only fair to the railroads, whose interests are so largely affected, but the public as well, should be assured of equal justice, as we all know that government by the people, to be a success, must be just.

You cannot enact a law that will injure or cripple any industry in the state without its reacting on every citizen in the state. The taxes paid by the Pennsylvania Lines in the state of Ohio in 1904 amounted to $1,249,033, or 3.72 per cent. of our gross earnings, which is surely in excess of that paid by any other industry in the state; and, while we have sometimes complained, yet we have paid them without dispute so long as they bore a reasonable comparison with the taxes assessed against other citizens; and we still stand ready and willing to pay our full share of any tax that is assessed uniformly and fairly upon all citizens of the state, but we ask in return that our rights shall be given that fair and reasonable consideration that you would give to any other subject upon which you were called to legislate.

If the investigations which I am urging you to make shall prove, as I believe they will, that a rate of two cents per passenger mile is not remunerative to the railroads, then it follows as a simple matter of justice that the existing law should not be changed and that to do so would work serious injury, both to the railroads and to the interests of the state of Ohio as a whole.

Statement Showing "Passenger Density" (which is an Index of the Population) Tributary to Some of the Principal Lines in Connecticut, New York, Ohio, Indiana, Illinois and Michigan.

Name of road.	Miles of road.	No. passengers carried—One mile per mile of road.	No. passengers carried—Per mile of road.	No. passengers carried—Per passenger train mile.	Average haul per passenger
Connecticut:					
N. Y., N. H. & Hartford	2,032	579,562	31,163	77	18.56
New York:					
N. Y., C. & H. R. R. R.	3,490	384,570	12,036	59	31.95
Erie R. R.	2,151.	264,335	9,654	63	27.38
D., L. & W. R. R.	770	477,235	23,310	68	20.48
Lehigh Valley R. R.	1,394	145,364	3,263	52	44.55
N. Y., O. & W. Ry.	548	102,348	2,990	56	34.73
Average, New York..	.....	303,614	10,401	61	30.35
Ohio: L. S. & M. S. Ry..	1,454	240,270	9,255	52	56.40
Big Four Ry.	1,891	174,259	3,236	54	53.85
Balt. & Ohio R. R.	4,026	175,235	3,855	51	45.46
Hocking Valley Ry.	347	111,285	5,705	49	19.50
Cin., Ham. & Dayton..	1,015	109,550	3,778	41	28.94
W. & Lake Erie R. R..	442	46,668	2,013	27	24.18
Lake Erie & Western..	880	55,219	1,876	31	29.42
Penn. Lines, N.-W. Sys	1,526	184,219	6,744	41	27.32
Penn. Lines, S.W. Sys.	1,423	240,208	7,317	47	32.83
N. Y., C. & St. Louis..	523	160,566	1,712	69	93.76
N. & W. Ry.	1,833	77,136	1,929	42	39.98
Average for Ohio.	.....	159,631	3,992	48	39.99
Indiana:					
T., St. L. & K. C. Ry.	450	92,677	1,719	45	53.89
Wabash R. R.	2,517	212,110	2,625	56	80.80
Monon Route	591	103,943	2,438	47	42.63
Average for Indiana.	.....	179,205	2,481	54	72.23
Illinois:					
Vandalia R. R.	688	191,129	4,187	54	45.65
Illinois Central R.R..	4,374	133,520	9,953	51	26.96
Chic. & East. Ill. R. R.	758	82,615	2,915	38	28.39
Chicago & Alton Ry.	919	262,967	3,573	73	73.60
C., R. I. & P. Ry.	7,205	76,792	1,675	43	45.82
Average for Illinois.	.....	112,777	3,019	49	37.36
Michigan:					
Grand Rapids & Ind..	573	115,818	3,578	46	32.37
Michigan Central R. R.	1,653	139,269	2,216	40	62.83
Ann Arbor R. R.	292	67,328	2,065	45	32.59
Average, Michigan..	.....	125,442	2,506	42	50.04

Passenger Statistics for the Year Ending Dec. 31, 1904, by Groups, as Shown in Poor's Manual for 1905.

	Miles.	Average—Rate received per pas'ger, cents.	Average—Earnings per passenger train mile, cents.	Average—Per mile of road—Receipts.	Average—Per mile of road—No. passengers.	Average—Passengers per pass. tr. mile.	Average—Haul per passenger.
Group 1. ..	7,807	1.79	113.19	$4,939	15,704	63.0	17.5
Group 2....	26,468	1.89	101.50	4,383	10,651	55.5	22.5
Group 3....	66,839	2.16	98.61	1,949	2,385	46.0	38.4
Group 4....	25,431	2.33	86.45	1,320	1,384	36.1	39.8
Group 5....	11,417	2.46	103.89	1,589	1,581	42.1	40.8
Group 6....	38,135	2.28	99.37	1,364	954	44.1	63.4
Group 7....	23,448	2.28	119.65	1,634	945	52.3	75.9
Group 8....	12,800	1.99	147.11	2,299	3,262	73.9	35.4

Group 1 includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.
Group 2, New York, New Jersey, Pennsylvania, Delaware and Maryland.
Group 3, Ohio, Michigan, Indiana, Illinois and Wisconsin.
Group 4, Virginia, West Virginia, North Carolina, South Carolina, Florida and Georgia.
Group 5, Alabama, Mississippi, Tennessee, Kentucky and Louisiana.
Group 6, Missouri, Arkansas, Texas, Kansas, Colorado, New Mexico, Oklahoma and Indian Territory.
Group 7, Iowa, Minnesota, Nebraska, North Dakota, South Dakota, Wyoming, and Montana.
Group 8, Washington, Oregon, California, Nevada, Idaho, Arizona, and Utah.

The Warren & Jamestown Single-Phase Railway.

The electric line which has recently been opened between Warren, Pa., and Jamestown, N. Y., traverses the valley of the Conewango creek, and connects the rich "Tiona" oil fields of Pennsylvania with the southern shore of the Lake Chautauqua. Warren, the southern terminal of the line, is located in the heart of the oil fields and the natural gas belt of the western portion of the state. It contains some 15,000 inhabitants, while its surrounding territory has a population of 10,000 more within easy access of the new road. Jamestown, at the other end, is a prosperous manufacturing city of 29,000 inhabitants, and is connected by steam and electric roads with the resorts of the Chautauqua region, whose summer population is estimated at 50,000. The New York towns of Falconer, Frewsburg and Fentonville, and Ackley, Russell and Glade, Pa., bring the total permanent population of the territory adjacent to the new road up to more than 65,000 inhabitants.

The equipment of the road is thoroughly modern, comprising horizontal gas engines as prime sources of driving power, and the single-phase alternating-current system of the Westinghouse Electric & Manufacturing Company. This is the first instance of a single-phase electric railway operated by gas engines. The current is generated in a power house without a boiler plant, transmitted at a potential of 22,000 volts over bare copper wires to transformer stations operated without attendants, fed to the central trolley section at 3,300 volts, to the terminal sections within the city limits at 550 volts.

The track is laid with 70-lb. rails on oak and chestnut ties and ballasted with gravel. The rails are connected by soldered bonds made by the Ohio Brass Company, and are cross-bonded at frequent intervals. The line follows the winding course of the Conewango and has many curves. The grades are heavy; one is three-quarters of a mile long with an average of 3½ per cent. and a short stretch of 7 per cent. The sharpest curve has a radius of 65 ft. Four turn-outs are now in use, but this number will soon be increased to five. The car barns are at Warren, Pa., and Frewsburg, N. Y., with the repair shop at Warren.

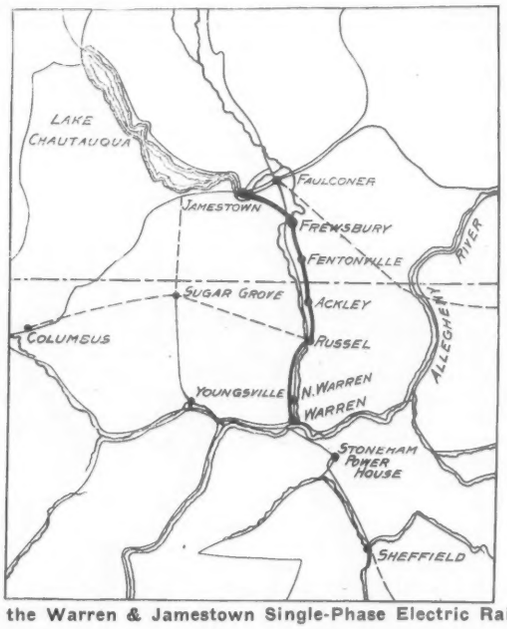
The power house is located at Stoneham, five miles south of Warren, that site having been selected by reason of its proximity to the natural gas pipe lines from which its fuel supply is obtained. The equipment includes two 260-k.w., 380-volt, 25-cycle, alternating-current generators of the revolving field type, which are direct-connected to horizontal gas engines operating at a speed of 150 r.p.m. The two units are connected in parallel and run together with remarkable smoothness. The engines were built and erected by the Westinghouse Machine Company, and the electrical machinery was furnished and installed by the Westinghouse Electric & Manufacturing Company.

The new type of horizontal double acting gas engine bears a close resemblance to approved steam engine practice. Symmetrical design has been adopted wherever possible, notably in the cylinder casting with its symmetrical valve chambers and in the pistons. A relay governing system has been devised which has proven en-

tirely adequate in respect to both regulation and parallel working, and which places this type of gas engine upon the same plane with large Corliss steam engine practice. To make all parts accessible the engine has been elevated to such a height that all parts are above the floor level. Inspection and cleaning, especially of cylinders, is possible without dismantling the engine.

Injury from neglect has been avoided by providing automatic auxiliaries, both oil and cooling water being delivered under gravity head, cylinder oil by positive pressure and compressed air for starting from storage reservoirs. The starting arrangement has proven particularly efficient, and with only two operations, opening up of gas and air valves, the engine automatically starts and comes up to speed under its own ignition without further attention. Less than a minute is required to bring the engine up to speed. A duplicate system of igniters is employed with four different combinations in each combustion chamber. Any igniters may be replaced while the engine is in service and in case of necessity any cylinder may be isolated for repairs during operation.

There are two main generating units of 260 k.w., 500 nominal h.p. capacity at present installed at Warren, with space for a third of equal size. Single-crank, tandem units were employed in place of twin tandem units in order to give greater flexibility of operation, the former representing the standard adopted by the builders. The units have solid couplings between engine and generator and operate in parallel on the station load in the same manner as an ordinary steam driven unit. The four-stroke cycle is used, which, with



Map of the Warren & Jamestown Single-Phase Electric Railway.

the tandem arrangement, gives a power impulse with each successive stroke of the engine. The cylinders are 21 in. in diameter by 30 in. stroke. The unit runs at a nominal speed of 150 r.p.m. For this particular service the engine is rated at 470 b.h.p., with a maximum of 520 b.h.p., giving a 35 per cent. overload capacity on the generator.

The cylinders are symmetrical about both axes and supported free from the foundations by front, center and rear housings. The front housing is anchored but the remainder of the engine is free to adjust itself to temperature changes. The jacket walls are cast free. The interior of the cylinders is accessible from above and below through valve openings without removing the heads. Solid forged steel crank shafts are used with positive pressure oiling at the pins.

The bearings are of segmental construction with wedge adjustment and water-cooled shells. The crossheads are of cast-steel with bored guides and adjustable slippers. The pistons are in one piece, cast symmetrical about both axes without internal ribs. They are mounted permanently on the rods and are water-cooled, being floated free from the cylinder walls. Nickel steel is used for the piston rods which are made with a bored water duct. The rods are made in two parts to facilitate handling and are united at the center crosshead. The rear piston may be disconnected. The packing is of the segmental metallic type, floating about the rods and internally lubricated. All the valves are of the poppet-type, spring seated in the direction of pressure and removable in one piece with bonnet.

One inlet valve for each cylinder end combines the functions of mixing, governing and admission. Each valve is under direct governor control. The exhaust valves are raised by a multiplying lever system giving heavy force at the start, followed by rapid opening. The valves are water-cooled and are always full of water.

The balanced system of governing is employed in which an

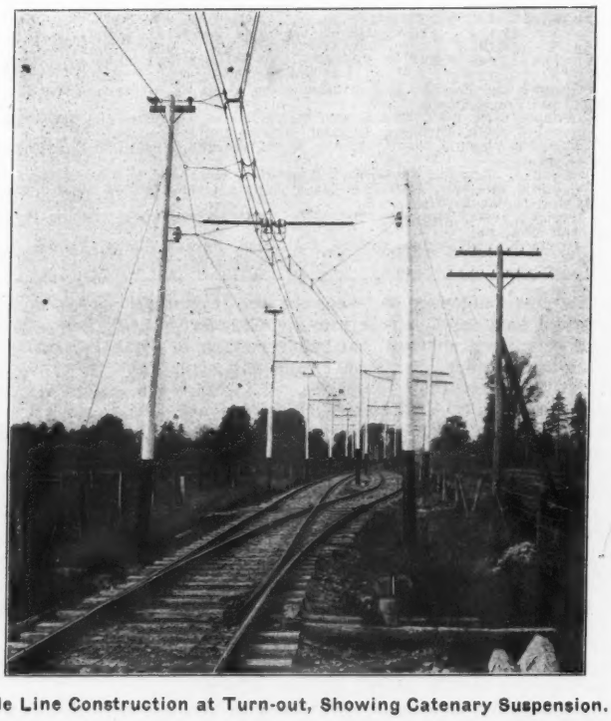
Transformer Sub-Station.

auxiliary oil cylinder does all the work of actuating the main valve. The sensitive centrifugal regulator is positively driven, as is the auxiliary oil pump supplying the relay system. Manual synchronizing adjustment for alternating-current working is also supplied.

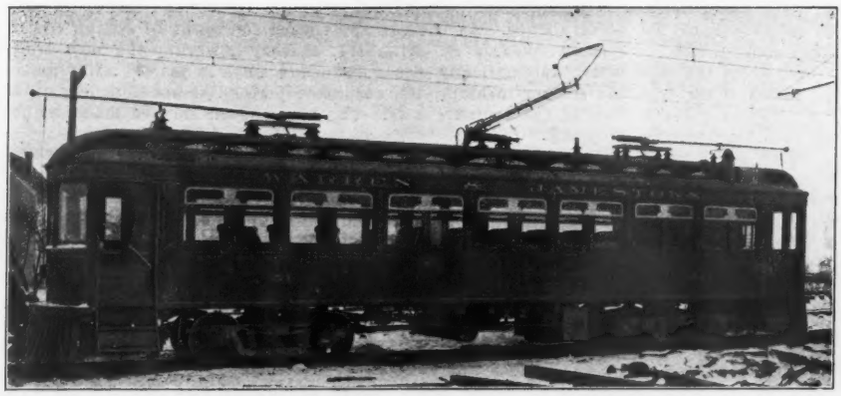
The ignition is of the hammer-break type, in duplicate, with two independent sources of current. The point of ignition is changeable and the igniter plugs are removable while the engine is running. An automatic safety stop is interposed in the igniter circuits. Separate water circuits are supplied for each important part with open funnel discharge. The pistons are maintained at an even temperature by a double-ended plunger pump attached to the center crosshead. A gravity water supply for the entire engine is used with an automatic motor-driven pump for maintaining a constant head.

The oiling is done with a gravity flush system for the engine oil with a filter and a positive-driven return pump. For the cylinder oil positive-timed injection from sight-feed pumps driven by engine is employed.

The Warren plant was started on Oct. 19, 1905, and has since been in continuous service, averaging 17½ to 18 hours a day without developing any trouble of a serious nature. The only prolonged shut-down was made after a two-months' run for the purpose of examining the condition of the interior of the first unit started.



Pole Line Construction at Turn-out, Showing Catenary Suspension.



Single-Phase Passenger Car on the Warren & Jamestown.

Every part was found to be in perfect working order without evidences of deterioration from wear or excessive strains.

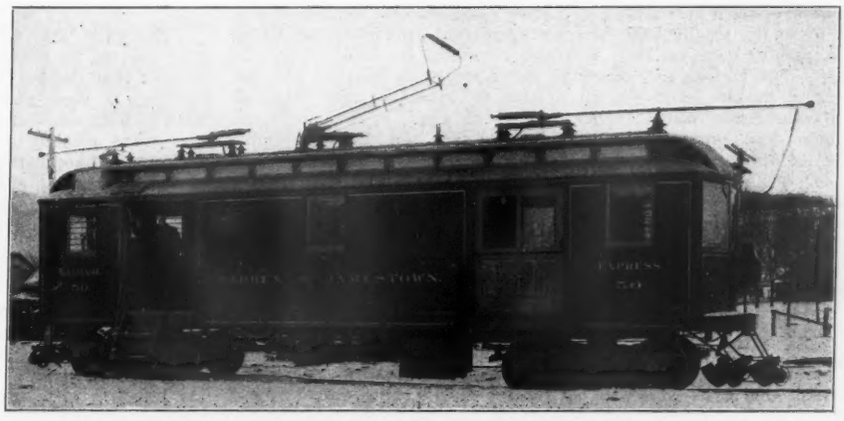
Daily observations of the gas consumption of the plant furnish an indication of its high economy. During the month of December, 1905, the cost of gas consumed by the interurban system averaged less than 50 cents per hour, or about 16 cents per car hour for 35-ton interurban single-phase cars. At present the large gas engines operate both interurban and city systems totaling 10 cars. During the week ending January 12 the cost of gas averaged less than 75 cents per hour, or 7½ cents per car hour, for three interurban and seven city cars. With this combined operation there has been realized a saving of approximately 20 per cent. in cost of gas over the independent operation of the interurban and urban plants, the former by the new horizontal and the latter by vertical type engines.

Fuel gas is available from several different points and is clean and uniform in quality, averaging from 1,000 to 1,100 b.t.u. total per cu. ft. Gas is obtained at a straight rate of 15 cents per 1,000 cu. ft., which places the cost of power so far below the usual figure that any other source of motive power is out of the question.

From the generators the current passes through a switchboard of blue Vermont marble panels completely equipped with apparatus and controlling devices to raising transformers of the Westinghouse oil-immersed, self-cooling type, which transform the potential from 380 to 22,000 volts. The two feeders which leave the station are protected by circuit breakers of the fuse type, disconnecting switches, low-equivalent lightning arresters and choke coils.

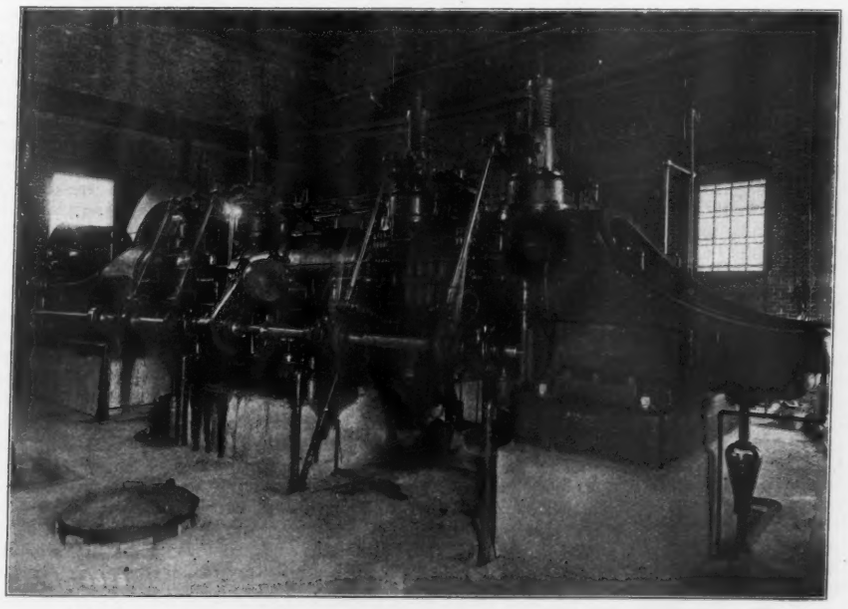
The high-potential lines of No. 6 bare copper wire are carried on porcelain insulators of the Ohio Brass Company, known by the trade name of Locke No. 406, which are supported on chestnut poles. Each feeder connects with a transforming station, one of which is located 1¼ miles from the Warren terminal and the other 1½ miles from the end of the line in Jamestown.

The transformer stations are made of concrete blocks and are of suitable size to permit a good arrangement of the apparatus. They are similarly equipped, each containing two 150-k.w., 22,000-3,300-volt, lowering transformers of the oil-immersed self-cooling type, which are controlled and protected by fuse type circuit breakers and disconnecting switches in the high-potential circuits and by oil switches and enclosed fuses in the secondary lines, one of which taps the 3,300-volt trolley section while the other feeds the city section of the trolley line through auto-transformers along the track which reduce the potential from 3,300 to 550 volts. Both high and low-potential feeder circuits are protected by choke coils and low-equivalent lightning arresters which are mounted in the transforming stations. The apparatus is symmetrically arranged, that mounted on one side of the station being exactly duplicated on the other. The two transformers are connected in parallel. Each has sufficient capacity to carry the entire normal load and either may be readily cut out of service.



Single-Phase Baggage and Express Car, Warren & Jamestown.

The transformer stations are operated entirely without attendants and require only occasional inspection. The building is fireproof. It contains no moving machinery or apparatus and has adequate automatic protection, so that there is no likelihood of trouble other than the opening of a circuit breaker because of excessive load. The high-potential feeders enter the transformer houses through protected openings under the roof. The high-voltage feeder leading to the Jamestown transformer station is carried upon the pole line which supports the overhead construction.



Interior of Power House, Showing One of the Two Gas Engine Units.

The trolley line is divided into a central and two terminal sections. The central section is connected direct to the transformer stations receiving alternating current at 3,300 volts. A No. 000 grooved trolley wire is swung by catenary suspension from a $^{7}/_{16}$-in. messenger cable which is carried on heavy porcelain insulators mounted on angle-iron brackets supported on the chestnut poles. The poles are 7 in. in diameter at the top and are 35 ft. high. They are painted white and black and present an attractive appearance. The white upper portions serve as useful guides to the line of track at night.

The overhead construction is particularly interesting. A detail shown in the illustration is the slight raising of one trolley wire at switch turn-outs, so that the bow trolley easily passes from one wire to the other without impairment of contact. At frequent intervals the messenger cable is anchored and steady-strain brackets are used at curves and turn-outs. A few of the curves are constructed with pull-outs. The catenary over-

head line construction is substantial, and has not given any trouble since erection. With such a line 3,300 volts is as easily handled as low potential direct-current with the usual overhead construction.

The central high-voltage trolley line is separated from the terminal sections by section insulators. Within the limits of the terminal towns the trolley lines are supplied with alternating current at the low potential of 550 volts. A feeder from each transformer station leads to three 75-k.w. auto-transformers which are located along the track and connected to a No. 0000 secondary feeder which supplies the trolley. The auto-transformers reduce the potential from 3,300 to 550 volts. They are swung between pairs of poles.

The low-potential trolley is supported from span wires by insulating hangers, in accordance with the standard practice for direct-current work. In Warren the cars run over the tracks of the Warren Street Railway Company, which is equipped with the direct-current system. The two trolley wires—alternating-current and direct-current—are suspended side by side from the same spans without appreciably complicating the structure or in any way impairing the service of either system.

The passenger cars are of the double-end, vestibuled, double-truck type, with 33-in. wheels and 5½-in. axles. They measure 52 ft. over all by 9 ft. in width, and seat 59 people on cross seats, which have high backs and are upholstered in green plush. The cars are supplied with baggage racks, signal circuits and many other modern features. A smoking compartment is provided at one end and on the side. They are finished in mahogany and are decorated in excellent taste.

The operating company has at present five passenger cars and one baggage car, all of which were furnished by the St. Louis Car Company. Each is equipped with four Westinghouse No. 108, 50-h.p. motors of the single-phase, alternating-current, compensating, series type, mounted one on each axle and connected by single reduction gears. The motors are connected permanently in multiple and are operated by the hand control system by means of taps from an auto-transformer which supplies a varying e.m.f. at the motor terminals. The controllers are of the drum type and closely resemble those of direct-current practice, though they occupy somewhat less space. They are mounted upon the platform at each end, so that the car may be operated in either direction. A feature of this installation is its simplicity and the small space required by the electrical apparatus. It consists only of one bow trolley, two standard wheel trolleys, two controllers, two canopy switches, one auto-transformer, two preventive coils with resistance, two fuse boxes, one change-over switch, and the necessary connecting cables.

The bow trolley is used on the 3,300-volt section and the wheel trolleys on the terminal sections of the line. The change-over switch is arranged to cut out the bow trolley and transfer the connections of the wheel trolleys from the low to the high-voltage service taps of the auto-transformer, so that, in case of accident to the bow trolley, the wheel trolleys, which are mounted on heavy insulators, may be used on the 3,300-volt section of the line. The bow trolley is pneumatically operated, the controlling valve being mounted on the platform within easy reach of the motorman. The wheel trolleys are handled in the ordinary way with ropes in which suitable insulators have been inserted to guard against the possibility of ground when used on a high-voltage circuit. The preventive coils and resistances eliminate arcing at the controller contacts when passing from one transformer connection to another.

The cars are equipped with Westinghouse straight air-brakes operated by means of an air compressor which is driven by a single-phase, series-wound motor of a construction similar to that employed for the main driving motors. Hand brakes are also supplied. The car, complete with equipment but without load, weighs approximately 66,000 lbs.

The motorman has the car under complete control at all times. It accelerates rapidly and without the slightest jar. It runs smoothly, and the alternating-current equipment responds readily to emergency demands, it being found possible to stop the car in a very short distance by simply throwing the reverse switch. As the controller handles are interlocking the operating drum must first be thrown to the off position.

The winter schedule requires two passenger and one baggage car. Commencing at 6 o'clock in the morning cars leave either end of the line every hour and a half; this service continues until 11.30 p.m. The run of 22½ miles is made in one hour and ten minutes, each car laying over about 20 minutes between trips. There are 53 stations along the line at which stops may be made; the average run each way includes about 15 stops. The two cars pass at a switch near Ackley, about the center of the line. Commencing at the Warren terminal, the schedule is as follows:

Warren to North Warren	10 mins.
North Warren to Ackley Switch	25 "
Ackley Switch to Frewsburg	20 "
Frewsburg to Jamestown Terminal	15 "
Total run, one way	1 hr. and 10 mins.

The maximum running speed is 50 miles per hour. The complete run from terminal to terminal without stops has been made in 47 minutes.

The change from the high to the low-voltage trolley is easily accomplished. As the car approaches the terminal section the motorman releases an air valve, thereby lowering the bow trolley which automatically closes down and locks in place. After passing the section insulator the conductor places the wheel trolley on the line in the ordinary way. The change-over may be made without stopping.

Under present arrangements the car is run two days with a mileage of 246, and is then brought in for inspection. The bow trolley shoes are found to give a life of approximately 10,000 miles. So far there has been no indication of undue wear of the trolley wire, nor has there been any trouble with the overhead structure.

The baggage car makes three trips per day on regular schedule, leaving Warren at 7.25 a.m., 11.40 a.m. and 4.15 p.m., and leaving Jamestown at 9.50 a.m., 2.30 p.m. and 7 p.m.

The present service of the Warren & Jamestown Street Railway Company requires a total of but eight employees, outside the general offices and car crews. It is made up of four men in the car barns, three power house attendants and one line-man. An additional line-man is occasionally borrowed from the Warren Street Railway Company. There are no attendants in the transformer stations.

The officers of the railway company are: Mr. D. H. Siggins, President; Mr. H. M. Preston, Vice-President; Mr. S. Q. Smith, Secretary. Mr. Siggins is assisted in the management of the property by his son, Mr. H. A. Siggins, a director of the company and general manager of the Warren Street Railway.

Railway Education.*

The daily activities of mankind have long since become too important to be neglected in the educational world, and it is now realized that the universities may shape their curricula with direct reference to these and yet lose little, if any, of the mental development so long considered a monopoly of the humanistic studies. The four years devoted to professional preparation for medicine or for the law are not commonly supposed to have any particularly injurious or warping effect upon the mind of the student; in fact, are conceived to be mentally stimulating and invigorating. Equally harmless and equally beneficial is the mental preparation for other practical pursuits of life; in either case, the chief essential in the arrangement of the educational pabulum is that the various studies shall be handled in a broad and scientific way, compelling, on the part of the student, both analytical and synthetical modes of thought. Thus, in existing universities, we find not only the traditional schools of law, medicine and theology, but also the modern schools of engineering, architecture, education, journalism, commerce and the like. In turn, the engineering school divides out into its civil, mechanical, and electrical branches, and, so right along the line, is to be seen greater and greater indication of the influence of the spirit of specialization, which, after all, is but a response to the demand that education shall adapt itself to the necessities of life.

The number of persons engaged in engineering, in architecture, or in educational work falls far below the number at work in the transportation industry, and yet there has been but little effort to provide technical training for the latter. As a part result of this, the railways are finding themselves to-day in lack of a sufficient number of men qualified to occupy, with dignity and success, the positions of initial responsibility, men who know how to do the right thing at the right time, who show initiative and originality when thrown back upon their own resources, who possess not merely physical or brute obstinacy but especially that inflexible mental determination and persistency arising from the realization of the trained mind as to the relation of the individual worker to the collective working. It may be that careful professional training will be of considerable benefit to those destined to attain to the seats of power in the transportation industry; I am inclined to think that it will. The conducting of modern transportation is becoming constantly more and more complex; the day of happy-go-lucky, rule of thumb railroading, while not entirely gone, will soon be but a shadow of the past. There is no industry at the moment which demands keener intellect, shrewder wit, and better trained comprehension; no industry in which the failure of these qualities in its officers and, to no small extent, in its men, would be more disastrous to the general interests of the country. The necessity for, and demand for, an adequate supply of these qualities is increasing with the extension of the industry. In sheer self-defense, even from a dividend point of view, the railways of this country will have to pay more attention than they have ever done before to the improvement of the quality of the men they take into their employment. For their own interests, they must stimulate a steady flow of the brightest minds of each rising generation into their service, so that they may have ample choice of selection in filling up the lieutenancies and corporalships, some of those appointed to which, in turn, will qualify for responsibility as captains

*Extracts from a paper presented at the January meeting of the St. Louis Railway Club.
†Of the University of Chicago.

and colonels, and, maybe, even as generals of the railway army. There are all varieties of transportation problems, but, without doubt, the most difficult one of all is that of securing competent and trustworthy service.

Let us now address ourselves to the consideration of a remedy for the situation. It seems to me that two kinds of work need to be carried on, the first and the one of primary importance being the development of facilities for technical training in transportation, granting to the various studies included in the same all the dignity of university teaching and making the transportation school as direct and natural an opening into transportation as the medical and law schools into medicine and law. The second is the more systematic provision of technical education for the men already in the service, the great majority of whom, for many years to come, must necessarily be without the initial training referred to in the earlier part of this paragraph. Much may be said in praise of the work accomplished for employees through the railway clubs and the educational branches of the railroad Y. M. C. A. and in other ways, but more needs to be done, with greater system, and with more pronounced educational results.

My proposal is that the railways should directly encourage the extension of transportation teaching at all of the larger universities. Even in our engineering schools, the attention given to the special equipment of the civil and mechanical engineer intending to enter railroad work has been but limited, and, so far as the commercial and operating sides of railroading have been concerned, their portion has been utter neglect. The courses in railway transportation, offered by so many of the universities, have been mere academic exercises, frequently taught by men without any living interest in or understanding of the railway organism, in no way affording the requisite technical preparation for a railway career. Such places as New York, St. Louis, San Francisco, New Orleans and many other university towns ought to have their own schemes, but the development should be greater in Chicago than elsewhere on account of the unique facilities it affords as the foremost railway center of the country.

The railway companies, as a first and great step, should cooperate in founding, in that city, a railway college. The task of establishing the college should not be leift to the railways centering on Chicago. The companies of the North, East, South and West will secure no less benefit from the realization of the project than the first named. I believe that the college should be placed in academic relation with the University of Chicago because the broadening influence of a great university would be a good thing to have environing its students. A mind running in narrow grooves is the worst possession a practical man can have, for it prevents him from appreciating the scope of his own duties.

One distinctive feature of this college should be the arrangement of the work of its members. The students should follow their classes from the beginning of October until the middle of June, and from that time until the middle of September should be placed out on the railroads at a small salary to learn the practical details of the business. They could be used to fill in the odd vacancies (which occur during every part of the year), and, even if they did not accomplish much, they would probably earn the small salary assigned. The combination, in each year of college life, of the theory of the class with the practice of the road would be beneficial both mentally and morally to the student. Any inclination to the "swelled head," acquired in the class room, would be knocked out of him most effectually by his associates in employment. During the whole period of the three months he would be required to submit weekly reports as to the work he was doing, with descriptions of and observations upon the same.

Admission to the college should be granted only to youths who have already proved the possession of a certain amount of ability and perseverance by graduating from the four years' course of a high-school. Nowadays, with the spread of educational facilities, there is no reason why this requirement should not be enforced. I know of at least one town with barely 1,500 population that possesses a high-school offering as strong a four years' course as many places of twenty times the population. In the high-school is, or should be, laid the foundation of a broad culture upon which the superstructure of railway technology could be raised with confidence. Though not necessary in some branches of the service, it might yet be advisable to add to the educational admission requirements a physical test, which should cover eyesight, hearing and general condition. Through these requirements there would be some assurance of obtaining the sound mind in sound body, so essential to the production of the highest results.

The courses of the railway college should provide training on five different sides: mechanical engineering, civil engineering, electrical engineering, commercial and operating, all with distinct reference, of course, to railroad work. To effect this, the college should be in close touch with the engineering department of the university, so that courses common to railroad and general engineering should not need to be handled in the railway college, only those courses coming under its direct charge which bear a distinctly railroad aspect, for instance, railway construction, maintenance of way, locomotive construction, locomotive tests, and so forth. The independent establishment of a railway college would necessitate the provision of an entire engineering equipment, and this enormous expense would be largely saved by the co-operation suggested. The students of the engineering side of the railway college would not only obtain a more comprehensive preparation for this special work of their future employment than would be given in any ordinary school of engineering, but they would also secure a knowledge of general railway organization and operation through the non-engineering courses, a certain number of these being included in their curricula, which would enable the novice railroad engineers to understand better than they often do, under the present systems of training, the relationships of their respective departments to the general work of the railway. The mechanical man would have some knowledge of track—a necessity, not an accomplishment, in these days, when the problem of high speed and weight of motive power and car equipment is so interlinked with that of track capacity; he would have some knowledge of accounting, sufficient at any rate to realize the relation borne by the expenses of his department to those of the whole railway; a thorough understanding of the working necessities of the operating department would form part of his mental equipment; and many other matters, that, aside from his work though they may appear to be, would nevertheless be of real advantage to him in the performance of his daily duties.

It has also been suggested that it would be an advantage if railway students, not specializing in engineering, were required to take a certain amount of work in this branch. In fact, the Canadian railways, in the transportation department which they have provided at McGill University, Montreal, have arranged for something of this kind to be done. Personally, I am inclined to agree with this policy, provided it be carried out in moderation, because (1) the training may be of practical value to the future railroad man, and (2) it insures that each student shall have the benefit of the accurate and scientific training arising out of the study of engineering and correlated subjects.

Turning now to the subjects of the curriculum, I shall confine my attention chiefly to the railway subjects proper. What railway subjects should be taught in the suggested college? The following technical courses could and should be given: Railway Construction, Maintenance of Way, Economic Theory of Railway Location, Railway Terminals, Plans and Specifications of Railway Structures of all kinds, Railway Accounting, Station Returns, the Construction and Use of Railway Statistics, Organization, Handling of Traffic—Freight and Passengers—Signaling and Train Service, Motive Power Equipment, Car Equipment, Rate-Making, Government Control of Railways, Passenger Department, Freight Department, Railway Finance, Telegraphy, Corporation Law in its Relation to Railways, Railway Liabilities, Law of Carriers.

The names of the subjects will largely indicate to railway men what would be the work of the classes held therein. For instance, the Handling of Traffic course, on its freight side, would deal with the methods of disposing of freight in the "out" and "in" freight houses and at transfer stations, the work of the yards, way-billing and expensing, supervision of fast freight, car service, per diem, and so forth, in each section of the work starting with a general type, then proceeding to description of other methods in use both in this country and abroad, and finally winding up with such critical work as may be desirable. Accompanying the class-room work, would be the actual observation of working methods on railways at points within reach of class visits.

Under the head of Freight Department would be handled the organization of the department, duties of officers, solicitation of freight, the industrial agent or commissioner, freight claims, clearing systems, and so forth, the whole course giving a compact survey of the actual work of the department, with due regard to differences of organization, policy and methods. Classification and rates, it may be added, would be handled in the course of Rate-Making. In a similarly practical manner, each of the other railway subjects would be treated, and, in the hands of competent professional instructors, would both inform and train the minds of the students.

Associated with these railway subjects would be the more general ones of mathematics, surveying, mechanical drawing, shop work, chemistry, physics, economics and English in all full courses, leading to the Bachelor of Science in Transportation. Students specializing in one branch or other of railway engineering would not be able to take all of the subjects named in the preceding paragraphs, but such selection would be made as seemed practicable and desirable.

Throughout the whole four years every effort would be made to exclude the incompetent and the idle. What would be the position at the end of the fourth and succeeding years from the foundation of the college? Each year there would be issuing from the college at the service of the railways, a picked body of young men, sound in body and in mind, not lacking in either culture or practical knowledge directly in line with their future work—young men possessing already, by reason of several summer seasons of actual rail-

roading, a useful acquaintance with their future duties, men capable of thinking and working, men ready to bring to their duties the accuracy and swiftness of scientific methods and the discretion and wisdom of the accumulated experience of railroads of past and present, of both East and West.

My remarks have so far referred to students of the railway college able to put in the regular four years' undergraduate period. Though it is to be hoped that these would form by far the largest constituency of the college, there are others to be provided for, who possess equal mental qualifications, but, for various reasons, must limit their education to one or two years from the date of graduation at high-school. For these the college should present a special arrangement of courses, emphasizing the railroad subjects, and yet giving some general training, so that a youth compelled to leave at the end of one or two years' work would be competent to discharge with success the duties of, say, a station agent—a branch of the service in which the railways are particularly weak at present—or any other suitable position. There are a great many young men drifting into the mind-restraining curricula of the shorthand and business school who, with the opportunity of a much more broadening kind of education before them, offering a direct opening into the branches of a profession where men, and not machines, are the great need, would be glad to take a one or two years' course in the suggested college. If there were associated with the college a department of correspondence tuition, these short course men could continue their technical education after they had entered the service, with advantage to themselves and profit to their employing companies. The ambitious boy with plenty of determination but little money in his pocket could probably find many opportunities of temporary employment—the close relationship existing between the institution and the railways would doubtless secure not a few advantages for such students.

The railway college, financed by the railways, would place at the disposal of the roads a number of scholarships. It is not difficult to see how the companies might well use these scholarships as one factor in cementing to their service the loyalty of the better class of their employees. Such scholarships could be offered in open competition to the sons of employees fulfilling the necessary educational and physical requirements for admission.

The companies would benefit by the leavening influence exerted by the steady influx of able and broad-minded young men, whose training would enable them to see far above and beyond the petty aims and strifes of unregulated unionism, and who would become natural leaders of thought among their associates. Their influence would strengthen good discipline, encourage amiable relations between men and officers, because there would be better understanding of one another's duties and responsibilities. The work of the school would have a direct bearing upon the labor problem as it faces the railway companies to-day.

A further thought presents itself, namely, that the specialized education of the railway college would induce in the mind of the future railway man a greater appreciation of his work, a stronger desire to remain in an employment in which his training would be more likely to bring ultimate success than in any other. The greater reliance with which railway officials could depend upon the service of the members of their various departments would be entirely beneficial to the companies. To some railway men, particularly unfortunate in the unsettled temperament of their subordinates, the change would seem almost Utopian.

Turning to the second kind of work which needs to be carried on under the head of railway training, namely, as previously stated, the more systematic provision of technical education for the men already in the service, the organization of this side of railway education must fall under three heads: (a) evening schools, (b) correspondence tuition, and (c) traveling teachers.

Our evening railway classes at Chicago, which are now in their second year, have had considerable success. A number of railways with interests in that city have met the expenses between them, in return, sending employees to the school on free scholarships. Our initial difficulties lie to quite an extent in getting hold of the right kind of material. A considerable portion of the men sent to us reveal no sign of any real desire to better themselves by hard work. Lacking in energy, determination and foresight, they are soon found among the backsliders. This class of men we do not want; they are not of the kind out of which real *railroad* men are to be made, though no doubt they ape the title. As experience lends wisdom to the administration of this work, we are hoping to be able to devise some method of selection which will enable the companies to fill up the classes with workers and "stickers." Of course, the conditions to which railway employees are subject render regular attendance at evening classes, with the due performance of home work in connection therewith, a task of difficulty and demanding great perseverance. Company's service, sickness or other unavoidable cause may compel a man's absence for two or three nights. He loses the connection, his back work has accumulated considerably, and unless he is gritty, he is apt to become discouraged. But it is the gritty men we want to train and not the weak-backed ones, so that if out of every two or three men sent us, under present conditions, we discover one worth while, the result is encouraging. Our school affords also a temporary abiding place for another type of man, not without grit or brain capacity, but yet an unreliable student. I refer to the man who measures his education on a strictly cash basis, poorly calculated at that; he does not want to waste his valuable time over any of the broader problems of railway management and policy, is indifferent to the manner in which the company's business is carried on outside of his own immediate work; with a metaphorical pistol at your head, he (i. e., his attitude, not his words) demands that you prove to him the possession of goods that can be transferred to him in the minimum time and at the maximum advantage of dollars per month to himself. He can see $10 per month increase in salary at the end of three months with a very appreciative eye, but is absolutely blind to a hundred per month increase three years hence. Here is a man that wilfully narrows his capacity, and, until something happens to reveal to himself what a fool he is, neither school nor company can hope to do anything with him.

In conducting the evening classes, our plan has been so far to compel every man in his first year to take similar work—traffic man, accounting man, operating man, motive power man, roadway man, all alike have had to pass through the same course, which gives a general survey of the more important features of the whole organization, work and policy of the railways.

[Notes regarding, and outlines of, these evening courses of the University of Chicago have already been given in these columns.—Editor.]

Of course, the treatment of each subject has to be more or less brief, but we have arranged our syllabus so that upon this class a number of more specialized courses can be built. However, it is probable that after the current year, our evening syllabus will be modified by dividing up this general course into its component parts, and treating both the elementary and more advanced stages of each part in one continuous class. This will probably induce the men, who are not willing to devote their time to the study of departments of the road other than their own, to put in solid work with the classes, and we are hoping that a year's experience, in classes relating to their particular departments, will have so broadened them and have so whet their appetites for more that they will desire to enter classes dealing with other parts of the railway organization. At least, if this does not happen, the conclusion will then have to be reached that such persons are educationally incorrigible.

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Another side of the Chicago railway education scheme, so far as it affects present employees, is that of correspondence tuition, a department which will probably open next October. This will give the opportunity of the higher training in railway transportation to the young man located, it may be, a hundred miles from "anywhere," and so improve the chance of bettering his position. It is the intention to reproduce some or all of the courses previously named as closely as possible in this correspondence department. The sentimental and material advantages to the correspondence student of membership in and work with a university of international standing are obvious.

At certain points where classes of forty or fifty employees can be formed, we are hoping to be able to handle some of the courses by the direct instruction of a traveling lecturer. Such a lecturer would have several centers established within accessible distance of one another, and would hold "school" at each one night a week during, say, six months of the year. He would thus be able to handle ten or twelve centers during the year. With half a dozen energetic and capable young men, of trained ability and with specialized knowledge of their subjects, a wide field could be effectively covered in this way.

In addition to this work of instruction, the railway college should become a world-famous center of research work. As its testing plants, appliances and libraries develop, its faculty and advanced students, in association with practical railway men, could be constantly devoting attention to the consideration of the improvement of railway facilities in all departments. I should like to see its libraries associated with a bureau of information, which should collect, classify and make readily accessible the results of the investigations of all countries and all investigators on railway subjects. Thus, if a railroad wished to have at its disposal a complete record of past and present experiments and experiences of other railroads in the matter of treated ties, it would be able to have drawn up for it by the bureau a succinct account of the same, or could send its representative to the bureau to investigate on the spot, with the help of the officers of the bureau and of the college specialists in that field. Or if a railroad wished to review the methods of handling l.c.l. freight in various parts of the country or abroad, similar facilities would be at its disposal, and so on. The value of the bureau, as administered by a scientific college in this way, and situated in the most accessible city in America, would be immense.

I should like to say much more in explanation of the undertaking which the railways centering in Chicago and the University of Chicago are endeavoring to carry out. There are some difficulties

in the way. The least serious one is that of finance. The work proposed to be done is so entirely in the interests of the railroad companies and will contribute so much to their more economical working, that there can be little doubt of their willingness to extend their financial aid to whatever amount is necessary. The annual income required is not really very large, probably never exceeding $100,000 per annum. At present we need but a fifth of that income. In fact, it should not be a difficult task within the next five years to secure a permanent endowment for the institution and its work that would provide adequate buildings and equipment, as well as a sufficient annual income for current expenses, thus relieving the companies from annual contributions. But even if the latter were to continue, the co-operation of twenty-five to thirty roads would reduce the quota of each to the insignificant sum of $3,000 to $4,000 a year. With hundreds of trained men graduating each year from the college, with thousands of railroad employees enjoying the benefits through evening classes, divisional schools and correspondence tuition, with the further advantages available in the Bureau of Information and in the experiments of its various plants, each road could depend upon getting good value for its money, even if its individual appropriation were twenty times as much.

A difficulty of more importance than the financial one, though still but temporary, is that of securing suitable instructors. We need men of the highest and broadest mental training, keen in investigation, sympathetic in teaching, men who possess the most desirable academic qualities and qualifications, and at the same time have the practical instinct. We see no other opportunity but to train our own instructors, and this we are proposing to do by taking able university graduates of suitable preparation, placing them for twelve months or so out on the road, a month here, three months there and so on, engaging in the practical side of the subjects in which they are specializing, studying the different methods in use and their relative values, consulting with and being advised by railway men of all grades and all opinions. Furthermore, not only will they do this before engaging in teaching, but, as instructors of the college, they will be expected to keep in touch with movements in their respective departments on the railroads, making investigation trips on all possible occasions. It has been suggested that the railway college should be largely staffed by railroad men. Where suitable men of actual road or office experience, efficient teachers and capable of real research work, in short, likely to do credit to the college, could be obtained, such could be made good use of. But the ex-railroad man who has "resigned" because of incapacity, we do not want; the ex-railroad man who has been worked out, we do not want; the ex-railroad man who is looking for a kind of retiring allowance in the shape of a nice easy job, we do not want. The railroad man of trained mind, high capacity and wide experience, possessing undoubted powers of discipline and exposition, associated with a strong personality, we do want, but we could not get him, for the railroads need this type of man for their own service, and are able to pay him anywhere from three to ten times as much salary as we could give him. A careful study of the question has convinced me that the policy of training our own instructors, securing them before they have the opportunity of making high salaries, men who combine the practical instinct with power of exposition, who possess love for research and are disposed toward teaching, is not merely the only feasible plan, but, except in special instances, the most desirable one.

Detention of Cars in Yards.*

The committee on conducting transportation presented the following statement from the Pennsylvania Railroad bearing upon experimental work undertaken with the object of facilitating the movement of cars through yards. This was followed by a discussion, part of which is included herewith:

You all know that there is need for better transportation. We have put a lot of money into railroad improvements, cars have been increased in their capacity, larger locomotives put on the road, and now comes the question of better and quicker transportation. We are endeavoring to formulate some methods by which car movement can be given closer supervision, and to establish such records and methods as will make it possible for us to keep in touch with yard delays, train and car movement, terminal delays and delays at sidings and point of shipments where freight originates. We have been keeping certain records during the past year, and find that our greatest trouble is to get cars through yards and released at terminal points. After we decide exactly what we are going to do as to keeping records and establishing better supervision in yards and at terminals, we then expect to take up and establish an audit (analysis of delays) at all stations, sidings, coal tipples, etc. I hope by the next time the Association meets that I may be able to give you something more definite on this subject.

Mr. Drew (Wisconsin Central).—If this is an important question to the Pennsylvania and the Baltimore & Ohio and all the other big roads, what do you think it is to the great majority of small single track roads such as we have in the West? We all know that in the west the yardmaster is an autocrat. He does just about as he pleases, and we have to let him do pretty much as he pleases, and if we can devise any scheme by which we can assist him in doing his work of getting his trains out and saving that long detention that we all know about, we shall have accomplished a great deal. We have a method now of obtaining information as to movements in yards. When I was a telegraph operator, I used to sit at the key and hear the despatcher: "When is No. 222 going to get out?" "Oh, I don't know; it is up in the yard." It would be waiting on a single track road in the yard to get out. Now we have our yards all connected by telephones, and when the despatcher asks the operator, he cries to a man in the other end of the yard and obtains the information promptly.

Mr. Aylesbury (Terminal Railroad Association of St. Louis).—Judging by number of cars handled we should be having one of the worst congestions we ever had in the St. Louis terminals, at the present time. We came to the conclusion that something must be done to eliminate the delay to cars in our yards, especially the movement of empty cars. We found out that one reason for delay was on account of being unable to give the yardmaster prompt information as to what disposition should be made of empty cars. When a freight drag comes into the terminal yards it has to be switched immediately or put on the hold track. If we put very many cars on the hold track we are congested. We asked the different superintendents if they would instruct their agents and yardmaster to card all loaded cars delivered to the terminal lines. A little card about 1½ in. square is used. When the Illinois Central brings a car into St. Louis, their agent at East St. Louis tacks this card onto the needle beam, showing they brought this car and delivered it to the Wiggins Ferry Company for the Iron Mountain. When this car comes back from the Iron Mountain it is delivered to the Wiggins Ferry and instead of calling up my office for disposition of that car, all the yardmaster has to do is to look at the little card on the needle beam and he knows that the car belongs to the Illinois Central. No one knows, unless he has seen this practice, what it means to the large terminals in disposing of these empty cars. The lines entering St. Louis are all vitally interested in the movement of cars through this gateway, and while they are putting these cards on the cars for our benefit, they realize the effort is returned one hundredfold in the return of cars to them without any delay or congestion in the terminals.

Mr. Seale (Southern Railway).—After the last meeting the Southern took in hand this matter of delay. I am sorry to say we had never thought of it before. We have made a betterment in the yard delays. We take, for instance, conductors' reports out of a certain terminal for 24 hours—from midnight to midnight—which shows the time that trains left there. Then I go back through my records and find the time that each one of those cars arrived by the conductors' reports, show the delay to each car, and then make an average; I do not know that I can tell you just what our delays were, but on the average about 18 hours. We reduced the average to 13. I understand the Pennsylvania says that five hours is considered too much. Really, it is too much. If we were to eliminate our carded train that goes right through a terminal, and take into consideration only the delays to slow freight, our delays would be something like 20, 22 or 24 hours. That seems unreasonable, but as a matter of fact it is true. We have bettered it, and are going to make a much greater improvement. I have now some blanks which we are just putting in the big yards to show what the delay is chargeable to—whether waiting for engines, waiting for the train to be madeu p, or waiting for other trains. Delay is chargeable to one of three things—waiting for an engine, for train to be made up, or waiting for passenger trains. Take a road like our main line for instance, from Washington to Greenville, Miss. There are seven relay points. Now take a load of slow freight with 13 hours delay at each of those points. Just see what it would amount to. It would be exceptional for the same load to meet with such delay at every one of these seven relay points. We have told our superintendents that it is all well and good for each of them at times to hold a train for tonnage, but if all of them were to hold the same train or the same bunch of cars, what would the result be? So now, none of our trains wait at terminal points. When you have a whole lot of traffic you cannot at all times do it, but we have arranged now so that we take care of each freight train as it comes in. We have company coal or something to fill in with that train to give it its tonnage.

Mr. Beecham (Chicago, Milwaukee & St. Paul).—And any one who has investigated the movements of cars on railroads will be impressed with the fact that they move very slowly. I am reminded of that by an experience I had not long since in tracing a carload of lumber that started from Chicago to Los Angeles. It was 60 days on the way, and we not only could not get any information about it, but we could get no answers to any inquiries made about it. And there are many such cases as that coming

*Extracts from the proceedings of the Association of Transportation and Car Accounting Officers, at St. Louis, Nov. 21 to 22, 1905.

up in railroad affairs every day. Many of these gentlemen have stated that freight moves with reasonable despatch on their railroads, but I want to put myself on record as saying that freight does not move with necessary despatch on any railroad. When it comes to handling less than carload freight, from all that I have been able to learn about the railroads in Europe, the railroads of this country are not in it, and you know perfectly well when you come to figure out the mileage that your cars make, that it is very low. One gentleman said here to-day that they move about four miles an hour. I can walk faster than that, and I am a poor walker, too. It is not a question of getting a load into a car. The man who wants to load the car will take care of that. It is not a question of getting a load out of a car. The man who wants the contents of the car will take it out if you give him an opportunity. But it is up to the railroads to move that car from where it is loaded to where it is to be unloaded, and they have not as yet solved that problem.

January Decisions in Railroad Law.

The following cases were decided in the United States Supreme Court and the other Federal courts during the month of January, on railroad matters:

Presumption of Negligence in Grade Crossing Accident.—The mere fact that a person is found dead beneath a railroad engine at a grade crossing does not of itself alone raise a presumption of negligent operation of the locomotive, and it is the duty of the representative of the deceased suing for his death to establish that fact. In such a case, a right to recovery will be defeated where the evidence shows that the deceased was familiar with the crossing and the operation of trains at the particular time in question, and that the accident could only have occurred by reason of his own carelessness in venturing upon the track at the time he did. St. Louis & San Francisco Railroad Co. v. Chapman, 140 Fed. Rep. 129.

Mail Carrying Contracts.—The condition in mail carrying contracts whereby the contractor is required to perform all services that may become necessary under the contract without additional pay, is construed by the Supreme Court to intend only those services reasonably within the contemplation of the parties at the time bids are advertised. The advertisements for these bids usually specify the amount of extra service likely to be exacted. In the case in question this amount of extra service was stated and the bids were made upon that basis, but Congress afterwards made provision for an enormous increase of the service and the Government contended that this should be performed without extra compensation. The service was clearly not contemplated at the time the bids were solicited, and the Supreme Court upheld the extra compensation allowed by the Court of Claims. United States v. Utah, Nevada & California Stage Co., 26 Supreme Ct. Rep. 69.

Hackmen at Station.—A railroad company having contracted with a transfer company for furnishing vehicles for incoming passengers, and the provision in this regard being ample, may legally exclude from its grounds all other hackmen and cabmen seeking entrance thereto for the purpose of soliciting for themselves the custom or patronage of passengers, and this right of the railroad company may be enforced by injunction. This rule of law, however, does not operate to prevent licensed hackmen from soliciting patronage from the public sidewalk at the main entrance of the station, provided the ingress and egress of passengers and employees is not interfered with. Donovan v. Pennsylvania Company, 26 Supreme Ct. Rep. 91.

The Swedish State Railroads have regulated the maximum permissible speed of trains by the weight of the rails. On tracks the rails of which weigh 81 lbs. per yard, 56 miles an hour is permitted; on 66-lb. rails, 50 miles; on 62½-lb. rails, 47 miles; on 50-lb. rails, 37 miles. But no train may run more than 37 miles an hour unless it is equipped with continuous brakes.

Construction of a Subway Tunnel Under the River Seine in Paris.

BY E. OMMELANGE.

The "Transversale Nord-Sud" line, or line No. 4, of the Paris Metropolitan subway system, is projected to pass the Seine at two different points. This passage, which is 358 ft. long and includes two underground stations, furnishes one of the greatest difficulties which are met with in the whole construction. Its cost is estimated at $3,100,000. The Prefecture of the Seine brought forward a proposal to use two twin tunnels of small circular section with a metallic lining for the Seine crossing. Instead, however, of adopting this plan, the proposal of one of the most successful Parisian engineers—Monsieur L. Chagnaud—was adopted. His plan provides for a single tube double track tunnel of the same dimensions as in the other sections of the Metropolitan. The project of the Prefecture was unsatisfactory, largely because it required a four per cent. grade on the approach to the edge of the river. Also the Seine was to be crossed on a level grade 46 ft. below the surface of the water. M. Chagnaud's proposal makes the crossing possible at 36 ft. 7 in. below the surface of the Seine, which is almost 10 ft. higher than in the other proposal, this change, of course, doing away with the necessity for so steep a grade on the approaches. Incidentally, it is interesting to observe that on the entire length of line No. 4 there are but three four per cent. grades, which is the maximum allowed on the Metropolitan's lines. These are, where it

Fig. 1—The First Caisson on the Mounting Stage.

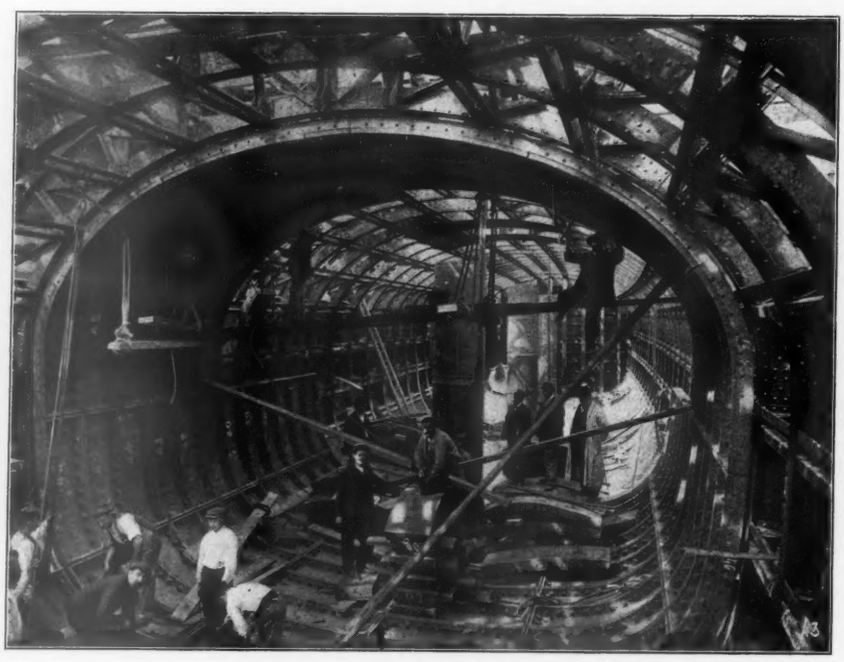


Fig. 2—Putting in Place the Cast-Iron Lining of the Caisson.

crosses under line No. 1, under the Orleans Railway, and under the Bierre sewer collector.

The type of tunnel used throughout the subway, except at the Seine crossings, has an interior section very little different from the common masonry type. In its construction a special type of shield is being used. The walls are formed by a cast-iron lining made up of rings 2 inches thick, which are themselves divided into arches having such curvature as will most effectively strengthen them to resist the pressure supported by the tunnel in the position which they are in each instance to occupy. To make the walls weather- and waterproof, creosoted planks of wood are placed in the bolted joints, and injections of cement made through and over the lining so as to fill up any vacant spaces that might remain between the outside curve of the arch and the earth surrounding it. Inside, the metallic lining is covered with a layer of asphalt 4¾ in. thick; that is, corresponding to the height of the ribs. This, in its turn, is coated with Portland cement $1^{3}/_{16}$ in. thick.

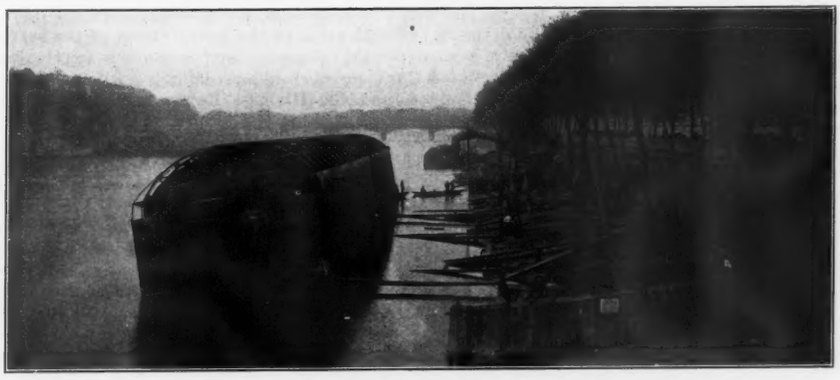


Fig. 3—The Caisson After Being Launched.

In the parts of the tunnel under the Seine, on the other hand, there will be some striking differences from this type of construction. The metal tubes forming the shell of the tunnel will be made in the same way as throughout the rest of the line, but will be surrounded by the metal caisson used in placing them in position. The whole of the space between the walls of the caisson and the tunnel proper will be filled with cement and concrete in which the angle irons, or ties, of the iron framing will be imbedded. This will make, outside the metallic lining of the tunnel, a lining of strongly resistant and practically indestructible masonry.

The construction of the first of the caissons to be built and its placing in position in the Seine are shown in the accompanying photographs. Fig. 1 shows the construction of the caisson on the mounting stage, arranged for it on the Quai des Tuileries. This illustrates clearly the ribbed construction, first placed in position, and later, as shown in Fig. 2, supporting the interior cast-iron lining, which is in that photograph being mounted. In Fig. 3 the caisson has been launched parallel to the river bank. Fig. 4 shows the same caisson completed, placed on the temporary mounting stage in the river and ready to be sunk. The caisson weighs 280 tons.

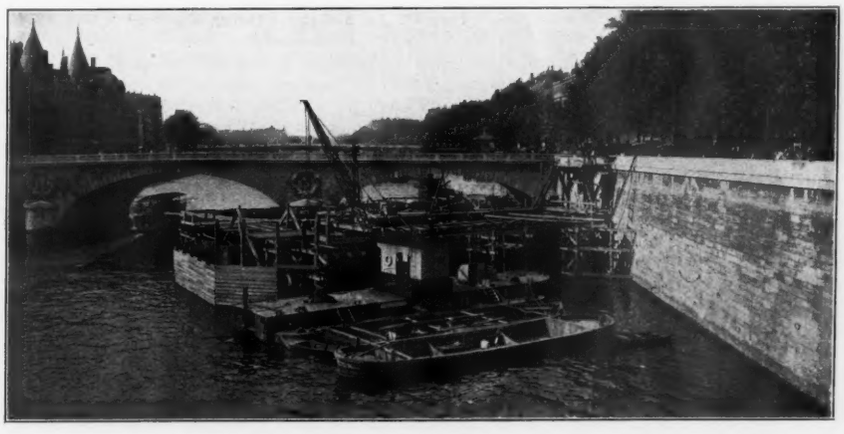


Fig. 4—The Caisson Ready to be Sunk.

There will be three such caissons used in carrying the tunnel under the main arm of the Seine, and two more in the crossing of the smaller arm of the river. Those used in the main arm will be 118 ft. 1 in., 191 ft. 7 in., and 121 ft. 9 in. long, respectively. The caissons to be used under the smaller arm of the river will each be 65 ft. long. All the caissons are made to conform to the circumference of a curve of 1,148 ft. radius. At their extremities they will be temporarily closed by means of metal bulkheads, which are to be removed when connection is made between the different sections of the tunnel. In order to make this possible, a space 5 ft. long will be left open between them; the connection being made by means of movable caissons. Two of these short movable caissons lowered vertically will make possible the construction of two masonry walls, which will form a joint with the abutments or jambs of the two extremities of the large caissons. These walls will be raised up to the plane of a horizontal supporting surface built at the ends of each two adjoining caissons. On this supporting surface it will then be possible to place the final short caisson, under cover of which the joint between the two longer ones can be finished and the panels forming the temporary extremities of the long caissons removed.

The construction of the various Seine crossings will include the use of three different processes. The compressed air shield method will be used for building a three-section tunnel; a compressed air caisson will be used for the tunnel of line No. 4 and for the two stations included in the Seine crossing; and the freezing process will be used at the crossing under the line of the Orleans Railway, because the working of this line must not be interfered with by underground construction work. Of these three methods of construction, the sinking of caissons by compressed air is the only one yet in complete operation.

The first caisson for the large arm of the Seine, nearest the right bank, (shown in the illustrations) has been sunk to its final level. In its construction, rapid progress was made by the use of automatic riveting machinery and pneumatic hammers. After it had been mounted and the iron plates which make it water-tight riveted on the outside, it was launched, as already shown in Fig. 3. This was made easier because it was first raised 7 ft. 3¾ in. above the surface of the river. The caisson was then towed to the point at which it was to be sunk. The position at the bottom of the river to be occupied by it was first dredged at a level of 16 ft. 4⅞ in. below the surface of the water, so as to enable the caisson to rest, when sunk, upon an even bed. Up-stream from this point guide piles were sunk, against which the caisson bears. These protect the caisson and also support a large platform. After the caisson was sunk and settled in position, the next piece of work taken in hand was placing the cast-iron plating on the tunnel. After this was finished concrete was introduced between the cast-iron lining and the outside jacket, until the caisson was thoroughly well supported upon the bed of the river. The shafts for access to the working chamber were then put in position, as well as the air chambers, which cap the whole. Sinking to the deeper level was then begun by means of compressed air. After the desired level was reached, the working chamber was asphalted. The tunnel, which had been filled with water to cushion the caisson and facilitate the sinking process, as soon as the caisson was in position, was emptied, the shafts for access to the working chamber removed, and the openings left in the plating carefully closed up. Telephone connection was made between the working chamber of the caisson and the buildings on the quey.

The two new tunnel stations to be built on the section where line No. 4 crosses the Seine will, in their interior arrangement, be quite different from the other stations of the Metropolitan lines. The actual envelope or jacket of the station will be formed by a section of asphalt injected around the lining. The metal lining is composed of iron plates $^{5}/_{16}$ in. thick, riveted to the outer transverse ribs, which, as in the tunnel caissons, are spaced 4 ft. apart. The arch will be fully centered and of 20 ft. 5 in. radius, the plane of the spandrels being 1 ft. 4 in. above the platform, which are only 10 ft. 5 in. wide, instead of 13 ft. 5½ in. wide, as in the other Metropolitan stations. On the inside—a feature common to all the Metropolitan stations—the metal lining will be covered with a thin layer of concrete, held in position by metal armoring, upon which there will be a lining of glazed tiles. Each station will be made up of three caissons, together 387 ft. long.

The center caisson is 223 ft. long, containing the station proper, and at each end there is an elliptic shaft connecting the station with the tunnel and containing the staircases and lifts which form the access to the station. The caissons for the stations will be mounted on

the ground. They will be 41 ft. high, 54 ft. wide and 190 ft. long.

For the accompanying illustrations of the construction and sinking of the first caisson for the Seine crossing we are indebted to Monsieur Bienvenue, Engineer in Chief of the Paris Subway.

The Division Engineer.

II.

In carrying on the work you do, never delegate to any one that supervision which, as Division Engineer, you are supposed to give. For example, the Roadmasters and Master Carpenters report to you, and you should not arrange that they report to your Assistant Engineer or to your Chief Clerk. You shirk your duty when this is done. You are not doing what you are paid to do. Again, you are having men report to an inferior in rank, as a Roadmaster or a Master Carpenter outranks an Assistant Engineer or a Chief Clerk. Finally, you are asking this younger engineer and this clerk to do work for which they are not paid. Have you a right to order a man continually to do work beyond his grade? Can you hold him then responsible for his mistakes? Nothing so takes the heart out of a Roadmaster as getting orders over the signature of his Division Engineer, which can mean one of two things, viz., that the Division Engineer never wrote the message, or that he has gone crazy. How do we feel when we get such a message or letter from the Chief Engineer's office? Surely, it will distress us less than our similar communication will worry a roadmaster. Then stop it before you well begin it. If your Chief Clerk needs to write letters about other things than accounts and bills, have him sign his initial after your name. If he sends a wire, have him sign only your initials or his own name to it, while you have it understood that messages you send will have more of your name than the initials. If an Assistant Engineer needs to wire or write, let him use his own name, and have an understanding with all about it. Or, when you are away, let him say, "In the absence of the Division Engineer you are directed," then sign the name of the Assistant Engineer. Remember, that a man on the spot has the best point of view, and that a good extra gang foreman on the spot ought to be as good, at least, as a Division Engineer 100 miles away. If you have the idea that your office as such can run your field work in your absence you have not the right view. "Railroads are burdened by bureaus and departments not properly balanced, which give a chief clerk in an office more authority than a higher-priced official on the spot."

The Division Engineer must not allow his own office force to annoy or to domineer over roadmasters and master carpenters. But this is not enough. From the Chief Engineer's office, from the Superintendent's office and elsewhere, he will receive foolish queries and aggravating letters. Never, under any circumstances, pass these things on to roadmasters and others. Take these troubles on your own shoulders. You can carry them better than they can. You should be the better drilled railroad man. It is mean to shift burdens to shoulders less broad than your own. Stand between your men and criticism, and they will stand between you and failure.

Never try to trick men under you. Be sure your Roadmaster will find you out. If the fact that trickery is wrong will not deter you, just bear in mind that you will get caught. "Honesty is the best policy, and I ought to know, for I have tried both," a fellow once said to me, who was just out of the penitentiary for horse stealing. I have never yet heard of a really successful Division Engineer on railroad work whose word was not as good as his bond among his men as elsewhere.

Regarding the relations of the Division Engineer with associated officials, the Superintendent, Master Mechanic, Division Freight Agent, etc. As railroads are generally organized he stands on what may be called the firing line. Here the work of maintenance touches that of transportation, motive power and traffic, and, sad to say, on some roads the clashing here is so great that a stranger would think it the warring of foreign powers instead of the working of parts of the same interest. It is expensive. Will it end? How often the end sought is not harmony, but destruction! One department tries to eat up another? Then dividends cease. The management changes; and the road, at its new birth, has then a saner existence. While human nature is as it is, harmony must be earnestly sought for. It will not come through gravitation. We have so many officials now who were telegraph operators or clerks yesterday that breadth of vision and trained tempers cannot be reasonably expected. These growing pains of American railroads must be lived through. Those of us with a little white in our beards sometimes wonder that roads ever earn a dividend at all. In spite of ourselves we waste ten times our salaries each year, and cannot help it, and carry out ill-advised work and practices. If we all worked for the company and quit working for promotion for its own sake, things would be better. Why do some of us want most to do that which we are least able to do? It is natural in youth and inexperience, but some never outgrow it. Why do some men always feel that the way to have certain work well done is to have that work placed in their hands and then they forget to look after it at all? There was once a Traffic Vice-President of a granger road who absolutely refused to express any opinion on track and always denied any knowledge of it. He minded his own (traffic) business. He now draws the highest salary of any railroad man in America. Other men can work with him.

The attitude of the Division Engineer to the Superintendent of that part of the line should be that of helpfulness, and a firm resolve to do all in his power to make the administration of that Superintendent a success. Whether or not the engineer reports to the Superintendent the principle holds the same. The division officials should do good team work. Star performance is costly and not in the interests of the stockholders. No effort should be spared to agree at once or else reach an understanding. If such cannot be had, then refer the difference in opinion or in understanding to the proper general officials, whose decision must be final. Never fight it out on the division. It will get into the lower ranks of the service and become a most deplorable conflict, causing endless friction and loss. If your Chief Engineer does not or cannot settle it, then he cannot carry his load, and the Division Engineer had better quit now while he is yet in no ill repute. Avoid quarrels.

But stress of circumstances or some mistake may place on a division a Superintendent whose hand is against every man. Then fight. The division is a hell. Though the sins of my life be many, I never expect to be punished hereafter as I have already been punished with such superintendents. But you need not be lonesome. The motive power and the traffic division officials are in equal distress. Never lose your temper. Do your work above criticism. Give that Superintendent plenty of "swing," and then, when he has clearly done you wrong and you can prove it, let him down hard. Show your knowledge of railroading. After a while he will learn to respect you, at least. After a while longer the company will remove him, and you will float up on a wave of reform. On an average, a Division Engineer has quite as long a railroad experience to draw from as a Superintendent, and should be more than a civil engineer—a railroad civil engineer. I once went to a division as its Division Engineer when I was a stranger there. I have told that Superintendent I never quarreled, but would fight in self-defense. We had no trouble, ever. He was a broad-gage man, and I went there in an emergency. Such a *modus vivendi* would not always do. I went to a division of another road where the Superintendent was at war with the head of the Engineering Department, and looked daggers at me as we met. In six months he was my firm friend, and remained so. At the same time I retained the good esteem of my superior—the head of the department. It was sailing pretty close to the wind. But never quarrel and never fear. I most dread a weak or inexperienced Superintendent. He does not know good work from poor work, and he meddles more. But if a Superintendent was writing this article he would no doubt express a corresponding fear about his division engineer.

RAILROADER.

How to be a Good Station Agent.*

I am very much gratified at being able to meet with you to-day, for personal as well as business reasons. I know from experience that we can do business together better if we are acquainted, and it is important that we should all understand the various instructions emanating from my office in the same way; then we will all be pulling together. Then again, I do not know it all. I have been benefited by meeting the agents on the various divisions, and have received suggestions that have resulted in improving the service. This is a strenuous age in railroading, as in every other line of business. Service that satisfied our patrons five years ago will not answer to-day. Then a shipper ordered a car, giving a reasonable length of time in which to furnish it; the shipment was made, and that ended the transaction. To-day a car of a certain dimension and capacity must be provided immediately it is ordered. A large percentage of shipments must be traced to destination. Nearly every large point on our line is reached by some other line, and it requires constant and persistent effort on our part to avoid loss of traffic through failure to provide the right kind of equipment just at the time it is required. . . . Conceit may puff a man up, but can never prop him up. A man should never be ashamed to own that he has been in the wrong. Our history contains the name of no man worth remembering who led a life of ease. Beware of a sudden rise in the world. The chap does not belong at the top of the ladder who didn't climb it honestly, round by round. Do the thing nearest to you, and do it well. No successful man lives without jostling and being jostled. He has to elbow his way through the world, giving and receiving offense. His life is a daily battle, but persistent, long continued and well directed effort will always win in the end. All things come to those who wait and hustle while they wait. **Keep an even temper** no matter what happens. This is a prime element of success. Never let the sun go down on duties undone. The best a man ever did

*Extracts from an address to agents by E. E. Betts, Car Service Agent of the Chicago & North-Western.

should not be his standard for the rest of his life. He should strive to do better.

Have a fixed purpose in life and work to that purpose. Don't quit your job because of some fancied grievance, and then be sorry for it the rest of your life. It is a serious matter for a man to change his occupation, particularly in middle life. Be sure you are thoroughly acquainted with yourself before you make a move. Clothes don't make the man, but they often go a long way towards securing a job, or, having a job, in securing promotion. "Cleanliness is next to Godliness." We cannot all be handsome, like your superintendent, but we can at least keep our clothes clean; our shoes shined; wear a clean collar; change shirts once a week and shave often enough so that we shall not resemble the Wild Man of Borneo. Recently a general freight agent wanted a traveling man and called in an agent who was promising material, but he was turned down solely on account of his personal appearance.

"Honesty is the best policy" always and ever. If something has gone wrong at your station, and you are taken to task, don't lie about it. Give the facts. If there are any extenuating circumstances state them. More men are dismissed for lying than because of the act lied about. If you are in the wrong, and you know it, don't argue the matter; acknowledge the fact; say you are sorry and that it won't occur again, and see that it don't. There is a time for all things. The time to tell your superintendent about the poor condition of your stock yards is before some business is lost, instead of after the other fellow got it and the matter has been reported to Chicago.

No booze fighter ever achieved lasting success. Whiskey will get the best of any man. It is an unequal struggle. "Cut it out." Keep things in order around the station. You will find you can accomplish about twice as much in a given time by having things in their right place, and there is nothing so annoying to a superintendent as to find the station office and other premises littered up and in an unbusiness-like condition.

An Early "American Special."

BY W. B. PALEY.

One of the earliest fast runs recorded in British railroad history took place in connection with what is now termed an "American special." On Jan. 15, 1840, the sailing packet ship "Siddons" anchored outside the Mersey about noon, having made the run across in the fine time of 17 days. She brought New York papers to December 28 and President Van Buren's message to Congress. This was awaited with considerable interest, a good deal of friction having arisen between the two governments over the Canadian insurrection, then very recently suppressed. It was impossible to get the papers and despatches to Liverpool in time to catch the 12.15 p.m. train on the Grand Junction Railway, which, though it seems almost incredible, was the latest train by which London could be reached the same day. About an hour after it had gone, however, Messrs. Willmer and Smith, news agents, obtained a light engine and overtook it at Stafford. The directors had a meeting that day and were not a little surprised at another request for a special, coming from a rival agent who had got wind of the other firm's enterprising effort. It was difficult to refuse it in common fairness, as he had not been officially informed of his rival's energy. Captain Cleather, the manager of the line, personally took the agent up through the tunnel from Lime street station (then worked by a stationary engine and ropes) to Edge Hill, telling him that it was doubtful if an engine would be found ready to go. By good luck one that could be spared had steam up and at 2.20 p.m. the messenger started on his journey of 96 miles. Not even a single coach was provided, the man in charge of the papers, and a boy who accompanied him, having to find room where they could on a four-wheeled tender so small that it only carried about 700 gallons of water and half a ton of coke. It was a bitterly cold day, not the smallest screen or weather-board of any kind was fitted to the engine, yet the messenger, with extraordinary pluck, said he should like to try the 60 miles an hour of the Great Western!

The original intention had been to catch the 6 p.m. train out of Birmingham, but as the little engine rushed along it became obviously possible to get there in time for the 5 o'clock. This train not only got to Euston half an hour before the 6, but was the one which the other agent had overtaken at Stafford. If it was caught therefore neither would have an advantage over the other as to the possibility of landing his "copy" in London in time for next morning's papers. Precisely at three minutes past five the engine slowed into the station at Curzon street, Birmingham, and to the great relief of the agent the 5 o'clock train had not left. The rivals proceeded to Euston by it, the first man in blissful ignorance of the second's arrival, and next morning the President's long-winded message occupied the whole of a large six-column page of *The Times*.

The route of the special would be over the Liverpool & Manchester Railway for about 14 miles from Lime street, turning off then by a curve down to the Grand Junction Railway at Newton Junction, then by Crewe, Stafford & Wolverhampton to a terminus, now a goods station, on the east side of Birmingham. From the time given, namely, 2 hours and 43 minutes, it is expressly stated that 23 minutes have to be deducted for stops for water and an obstruction outside Birmingham. This leaves 140 minutes for 96 miles, equal to 41.14 miles per hour. So many as six stops are said to have been made in all, and the average running speed was probably not far short of 60 miles an hour. The Grand Junction passenger engines were six-wheelers, with single drivers, in some cases only 5 ft., in others 5 ft. 6 in. in diameter, with carrying wheels 3 ft. 6 in. They had inside cylinders, variously 12½ and 13 x 18, massive outside frames of wood and iron bolted together, and carried a dome near the funnel. The line was one of the three allies which in 1846 united to form the London & North-Western, which has perpetuated the names of many of the original Grand Junction engines in its own locomotive stock.

How a Station Agent Should Handle Freight Cars.*

We have cars of different capacities—some 40,000, some 50,000, some 60,000, and some 80,000 lbs. capacity. It costs money to haul an empty car, and it costs more to haul an 80,000 capacity empty than it does a 40,000 capacity empty, because it weighs more. Therefore, it is obvious that we do not want to furnish a 40-ton car to move 20 tons of freight if it can be avoided. A car order should state the capacity of the car wanted, in order that the despatcher may, if it is practicable and economical to do so, furnish you with a proper sized car—but remember this, the first consideration is to secure the business. Never permit a car of freight to get away from you on account of waiting for a car of the proper capacity. We would prefer that you use any kind of a car rather than absolutely lose a shipment of freight.

The loading of cars to their maximum capacity has a marked bearing on economical transportation. Our average revenue tonnage per car is about 12 tons. This is too low. It has not been increased for three years, notwithstanding that during that time we have largely added to our heavy capacity equipment and destroyed a large amount of small equipment. We ought to increase this at least 10 per cent. Such an increase would reduce our empty mileage to just that extent and add to our revenue train tonnage. The rate on grain from Missouri Valley to Chicago, locally is 14 cents. An 80,000 capacity car loaded to 10 per cent. above capacity, which is our standard maximum loading, at this rate would earn $123.20. The same car loaded with 60,000 lbs. would earn $84.20. By failure to secure full utility we, therefore, lose $39 of the earning capacity of this car, or approximately 32 per cent.

Again, an 80,000 capacity car weighs approxim[illegible] lbs. Loading it to 10 per cent [illegible] every ton of dead weight of car hauled, we earn $7.25 revenue on the load. Assuming that we use an 80,000 capacity car to handle a load of 60,000 lbs., we receive for the load $84. For the 17 tons deadweight of this same 80,000 capacity car we earn from the load therein $4.94 per ton. It is, therefore, apparent that we lose $2.31 per ton on this car from Missouri Valley to Chicago. Experience teaches us the approximate cost per mile for handling empty cars is 2 cents. This indicates that it would be economy to have moved a 60,000 capacity car empty 1,960 miles to care for this load, provided we utilized the 80,000 capacity car to the full percentage of utility at the same or some nearby point.

We secure on grain between 85 per cent. and 90 per cent. of the capacity of the car, while our standard load is 110 per cent. From this you will observe that we lose between 20 per cent. and 25 per cent. of the utility of each car, or for every four car loads of actual freight to be handled we are using five cars to handle the commodity. This is equivalent to hauling one car empty from Missouri Valley to Chicago, because all of the commodities handled in the five cars could have been handled in four.

Further, we frequently move cars empty from Chicago to Missouri Valley. The conclusion, therefore, is that we have hauled one car from Chicago to Missouri Valley and return empty, without revenue earnings. The distance from Chicago to Missouri Valley is 467 miles, or 934 miles for the round trip. It costs us 2 cents per mile to handle an empty car. We have, therefore, expended $19.68 of the company's money with no return. Why? Because the local representative on the ground either failed to secure the proper car for the shipment to be moved, or failed to insist on the shipper loading the car to its full capacity, because it would be a little extra expense to the shipper to get into the car and shovel the grain back to enable him to get a sufficient amount in the car to bring it up to our rating.

When a heavy traffic is moving and equipment is at a premium, the most important thing on this railroad is the prompt unloading of cars and their movement to points where wanted. The mileage of our cars has steadily decreased during the past three years. We want to correct this and start the ball rolling in the other

*Extracts from an address to agents by E. E. Betts, Car Service Agent of the Chicago & North-Western.

direction. There is no such thing as a surplus of equipment now on this system at any time of the year. Foreign cars arriving at your station should be given preference in the matter of unloading, securing disposition before the car is ready to move, and seeing that it is moved after it is ready. No foreign car should be delayed at any station a minute through failure to have disposition in your possession.

If a foreign car is loaded it should be so loaded as will take it off the line, if possible, or loaded in direction of the junction point. In operating under per diem and penalty we cannot ignore the proper home routing of cars, or at least in loading them to some point that will take them off our rails and avoid the penalty charge. If, for instance, you had an empty Erie car at your station and had a load for New York City, routed via the Lake Shore, it is no crime to load the Erie car because we are loading it into home territory and other lines are using our equipment in a similar manner. Of course, it is desirable to load a car via the home line, if possible, but some latitude is allowed in matters of this kind.

Form 55—a home route card—was gotten up to provide agents and everybody having to do with the handling of foreign cars, necessary information to insure that cars are economically handled. One of the essential features of this form is the date the car is received from a connection, as 30 days from that date, if the car still remains on our line, this company is obliged to pay one dollar a day for its use. We have had considerable trouble on account of agents at junction points failing to give all of the information required on this blank, particularly the date of receipt and the date the car will become "penalty." Many agents simply fill in the car numbers and initials. This defeats the purpose of the form—it is of no use whatever. If a foreign car arrives at your station with a Form 55-A improperly filled out it is up to you to secure the necessary information through your chief train despatcher and then properly make out a card. Because somebody at the other end fails to do his duty is no reason why you should allow the car to leave your station without a full and correct home route card.

If you have a foreign car billed and not moved, report it to the train despatcher at once. If you are holding foreign cars for prospective business report them on the 46 report. Keep the despatcher advised of your wants in this line. It may be more economical to hold a car if you can use it in three or four days. At the same time, that is a matter for the despatcher to decide. He has in mind the needs of the entire division.

Do not load any foreign cars to non-per diem roads. If you haven't a list of these non-per diem roads it can be obtained through my office. If at a junction point you have any foreign cars for delivery to a foreign road see that delivery is effected before midnight. That will cut off 20 cents on every car. There is a difference of 20 cents between the delivery of a car to a connection at 11.59 p.m. and 12.01 a.m.

Don't educate shippers to think because we have a few new series 40-ft. furniture cars that they can be furnished on every order that is placed for this class of equipment. These cars were built for a special purpose. We have orders for more of them than we can furnish. If we are short of cars, don't advertise it to shippers and cuss the despatcher. Put the best side out; put on a little more steam yourself and get a faster move on unloading your cars. Keep in touch with shippers; get information as to the future business, and keep us advised. Don't hold cars around your station, thinking perhaps you are going to require them in a day or two, when the man at the next station may be turning away freight for want of cars. This matter must be looked at from a whole road standpoint.

Foreign Railroad Notes.

The hours for a day's work in the shops of the Prussian State Railroads have been reduced to nine.

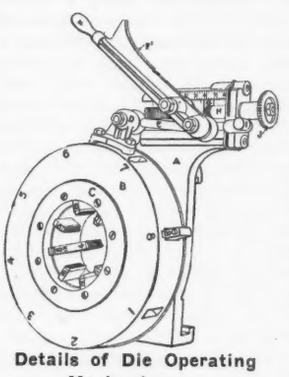
The Austrian State Railroads have agreed to give a limited number of free passes yearly to retired and pensioned employees and to certain members of their families.

The Italian Ministry under which the operation of the railroads by the State began has been dissolved, after a life of only nine months. The management of the railroads was not in question. The new Minister of Public Works is Signore Tedeseo, who has held the place before, and is said to be *persona non grata* to the railroad companies, with whom important questions are still pending.

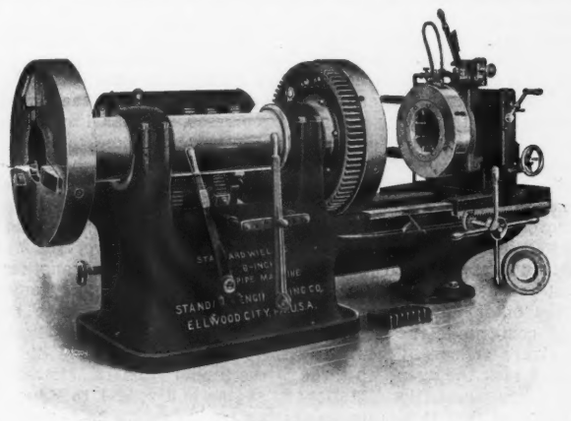
The new President of the Swiss Confederation, Dr. Ludwig Forrer, is a railroad man; at least, he has for two years been Manager of the International Railroad Freight Law Bureau, and at the same time Honorary Professor of Railroad Transportation Law in the Berne University. For 26 years he has been a member of the Swiss National Council. He is best known as the author of a proposed law concerning insurance against illness and accidents, which has been much praised by adherents of State Socialism in and out of Switzerland, but which has been defeated in Switzerland by the opposition of the country people.

The Standard Wieland Pipe Threading and Cutting Machine.

The accompanying illustration shows a 6-in. standard Wieland pipe threading and cutting machine made by the Standard Engineering Co., Ellwood City, Pa. The bed of this machine as shown, including the journal-boxes, is cast in one piece. It is provided with a trough for catching the oil which is delivered to the die head and cutting-off tool by means of a rotary pump. The die operating mechanism is independent of the adjusting screw, as is shown in the line drawing. The adjusting screw H passes through the fulcrum nut or block G, which is provided with a clamp gib to lock the adjustment. Moving the fulcrum block G to the left by turning the hand-wheel J contracts the chasers radially, and by moving the block to the right the chasers are expanded. The lever F has an arc-shaped fin which rides on its rest and automatically centers the lever and connecting link E in a straight line at all points of adjustment. The finished threads are prevented from being gouged or damaged inas-much as the chasers are withdrawn from the pipe the moment the lever is raised. The cam ring B has an opening opposite each chaser which allows the passage way to be cleaned without removing the ring. The lower chasers marked 1, 2, 3 and 4 have a groove and are put into place from the inside of the die head in the order named. The upper chasers, 5, 6, 7 and 8, have projecting pins and are inserted from the outside through holes in the periphery of the cam ring. They are firmly held in position so that they will not drop out. The chasers are unusually deep, and will cut a full thread at one cut. Those for 6-in. pipe will, when new, cut a perfect thread or screw 2⅛ in. long. This enables the cutting of a full taper thread for heavy fittings tapped deeper than standard, and it also allows the entrance of the chasers to be ground when necessary and still leave enough depth for a standard thread. Chips are prevented from passing into the cam ring by means of the face ring C, which is secured to the die-head by screws. The die-head A is arranged on a slide so that it can be slid aside before cutting off the pipe or removing it from the machine, thereby preventing the ruining of the bottom chasers by dragging the pipe across them. The cutting-off slide has a tool post so that the burr may be bored out of the pipe by placing the cutting-off tool at an angle.



Details of Die Operating Mechanisms.



The Standard Wieland Six-Inch Pipe Threading and Cutting Machine.

The steady slides are universal and have removable steel V-jaws. The chuck jaws are independent and are provided with renewable steel teeth. The jaws of both the front and the rear chuck project beyond the face of the chuck shells; this makes it possible to grip short nipples in the front chuck and to screw flanges to pipe by power by holding them in the rear chuck jaws. Six spindle speeds are attainable by shifting gears driven by a single speed pulley. The change-gears are shifted by means of levers placed at the operator's side. The countershaft has two friction clutch pulleys, 16 in. in diameter, for 5-in. double belts, and should be driven at 200 r.p.m. The floor space required for this machine is about 4 ft. by 10 ft., and its net weight is about 5,500 lbs. These machines are made in several sizes, and are used in a number of railroad shops, including the Pennsylvania, the New York Central & Hudson River, and the Erie. When desired they can be fitted for motor drive.

GENERAL NEWS SECTION

NOTES.

The Delaware, Lackawanna & Western is having 27,000 signal flags made at the Old Ladies' Home at Elmira.

The gravity freight yards of the Missouri Pacific in the East Bottoms, Kansas City, have just been put into use.

A bill has been introduced into the legislature of New York to require two motormen on each train of the Elevated roads in Brooklyn.

The Committee on Railroads of the Massachusetts legislature has rejected the petition of Representative Dyer that the use of chemical fire extinguishers on passenger cars be compulsory.

A Chicago press despatch says that on February 5th and 6th 25,000 passengers were carried to the Southwest on tourist or other low-rate tickets. The movement has been delayed on account of the absence of cold weather.

Increases in wages are reported of conductors on the Pensacola division of the Louisville & Nashville; enginemen on the Norfolk & Western; track laborers on the New York Central, and track and bridge men on the Chesapeake & Ohio.

According to a Harrisburg paper, the Pennsylvania will, after the first of July next, require all cars in all trains to be equipped with air brakes; and after Jan. 1, 1907, the company will accept no cars from connections which are not suitable to be moved in heavy train service.

The Railroad Commission of Texas has compiled a statement which shows that during the calendar year 1905 earnings of 12 Texas railroads were divided as follows: Texas local traffic, $10,456,180.39; Texas interchange traffic, $7,721,191.98; interstate and international traffic, $26,169,597.47.

In a suit for $10,000 damages brought at Philadelphia by a man who was run over by a Pennsylvania Railroad cab, it appeared that the railroad company, while acknowledging ownership of the cabs, denied liability for damages, because each individual cab is leased daily to the man who drives it.

According to the report of the Secretary of State of Pennsylvania, the street railroads of Pennsylvania earned during the year of 1905, $37,889,000, and their surplus, after $9,554,296 in dividends was paid, was $123,072. The total capitalization of these roads was $387,112,703, and their mileage was 3,169.

The superintendent of the Indian school at Carlisle, Pa., asks for an appropriation for traveling expenses for members of the school of $19,000, instead of $13,000 as in former years, for the reason that the railroads have discontinued the reduced rates heretofore given for transportation of pupils and employees of the school.

A press despatch from Hazleton, Pa., says that the fashion of carrying funeral parties in trolley cars, which has been common in that region, has been seriously interfered with by a new law of the state, under which the Health Department forbids the transportation of coffins in cars, except when they are encased in the regulation boxes, and these boxes are too large to be taken in the usual trolley cars.

At Montreal last week ten passengers were admitted to a train of the Canadian Pacific on one ticket and a half. The party consisted of a little French Canadian woman with nine children, only one of whom was old enough to pay half fare. This beats Arkansas. When this story last appeared in print it came from St. Louis, and the heroine, who hailed from Arkansas, boasted of only eight children.

The two-cent fare bill, passed by the legislature of Ohio, was signed by the Governor on February 8 and goes into effect 30 days after the date of signing. The two-cent requirement applies to all passengers on the railroads of Ohio, for all distances over five miles. Officers of the Pennsylvania, the Erie, the Wabash and the New York, Chicago & St. Louis are quoted as saying that the railroads will not contest the constitutionality of the law.

The Railway Commission of Canada has issued a code of rules regulating car service (demurrage) on the railroads of the Dominion. In a preamble to the rules the commissioners say that demurrage is reasonable and affords only a fair and just distinction between shippers or consignees who exercise diligence and those who do not. The commission has not had time to decide on the merits of the claim that the railroads ought to be penalized for delay in supplying cars or in transporting goods. The board also refuses to recognize the "average" method of charging for demurrage, by which a consignee who unloads a large number of cars promptly thereby earns an allowance on other cars which he may detain. Objection has been made to demurrage bureaus, but the commission holds that as long as they are only bureaus they are unobjectionable. The board "hopes that railroad companies will endeavor to secure the fair and impartial administration of the rules; in case it is found that the giving of preferences cannot be otherwise prevented, it may be necessary to abolish the car service toll entirely." The new rules are in several respects more liberal to the public than the old. Where unloading is hindered by inclement weather the local agent must decide whether or not to make allowances therefor, instead of referring the case to some distant authority after the full bill has been paid. If the railroad cannot tell the consignee at 7 a. m. where to find his car, he is free to go away and come again at noon, and the period of free time will then begin at noon. Additional free time is allowed on coal and lumber and other building material.

Anthracite Coal Shipments.

The *Wall Street Journal* gives the following figures of shipments of anthracite coal by months for the last three calendar years. The shipments during the month of January, 1906, were 5,458,048 tons.

	1905.	1904.	1903.
January	4,408,578	4,134,245	5,964,950
February	3,922,601	4,326,269	5,070,608
March	5,258,537	4,375,033	5,211,450
April	5,278,401	5,407,786	5,044,998
May	6,005,158	5,285,079	5,156,449
June	5,844,052	5,728,795	5,436,497
July	4,546,743	4,623,527	5,377,495
August	5,041,838	4,331,854	5,169,402
September	5,082,232	3,967,600	4,654,444
October	5,205,364	5,131,542	3,925,642
November	5,421,584	5,419,878	4,091,148
December	5,395,113	5,063,144	4,259,748
Total	61,410,201	57,492,522	59,362,830

The Canadian Railway Commission.

The Canadian Railway Commission has amply justified itself and, in spite of the detractions of political opponents, has become established as one of the indispensable institutions of the country. Since February 1, 1904, it has issued over 1,500 orders and held hearings in 350 cases. At present, the applications to the court average about 35 a day, although three-quarters of these will be privately settled.

The officers of a railroad passing through the property of a farmer in Ancaster applied to the court for leave to fill up a trestle bridge. The farmer used the passage under the bridge for his cattle, and objected to exchanging this safe method of going to and fro for the level crossing the company offered him. Under the old dispensation he would have had to go to Ottawa to look after his rights. As it was, he was able to drive into his neighboring town, where the commission sat, and after a short hearing he got a decision that his objections were well founded, and the application of the railroad was disallowed.

A. Scobell, a farmer on the line of the Kingston & Pembroke Railway, has a cedar grove. The freight rate quoted to Mr. Scobell on cedar, whether in the form of ties or poles, was twice as high as the rate on other poles. Mr. Scobell appealed against the rate, and appeared before the commission in person. He got an order from the court reducing the rates to the level of the general rates for that class of freight, the court holding that the rates in force obstructed instead of encouraging business, and that the railroad was restricting output with the obvious design of making sure that the road's future needs in the way of ties would be provided for.—*Toronto (Can.) Globe.*

Diversion of Cars.

A circular requesting information regarding diverted cars has been issued by the Committee on Car Service of the Association of Transportation and Car Accounting Officers. The month of November, 1905, is taken as a representative period, and the committee is endeavoring to secure information regarding a series of 1,000 consecutive numbers in box-car equipment of each railroad, in order to obtain a basis from which to judge of the prevalence of the practice referred to.

The present car situation appears to be that of a practically pooled equipment, without the power being possessed by any central authority to order cars from one territory to another. The result is that the flow of equipment is governed largely by the flow of the traffic; and it is extremely difficult for lines that are essentially originating lines to obtain that proportion of the return flow of the equipment upon which they must necessarily depend for a constant and equable supply. The whole subject of the requirements of the

traffic and the car supply in connection therewith, equally distributed, is a problem which must be met sooner or later. A step in the right direction was taken at the time that per diem was adopted; but further steps must be taken before full advantage may be obtained from the advance already made. Under the per diem plan an incentive has been provided to induce more prompt release and handling of equipment, but so long as The American Railway Association Code of Car Service rules are not observed there appears to be no incentive to induce the flow of equipment in accordance with the ownership of the cars, rather than along the lines of the flow of traffic.—*Equipment Register.*

Canadian Grain Shipments.

The total shipments of grain by water from Fort William, Ont., and Port Arthur, during the navigation season just closed, amounted to 37,063,000 bushels, of which 30,235,000 bushels were wheat; 828,000 oats, barley, etc., and 6,000,000 bushels, last year's crop. Of this amount, 10,600,000 bushels went to Buffalo, and 600,000 to Erie, 10,000,000 bushels being carried in United States vessels. The largest single cargo was 351,047 bushels, which is the record for the Great Lakes. There are about 40,000,000 bushels of wheat left in the Canadian West to be exported, of which perhaps one-tenth will be shipped by railroad during this winter and the remainder by water next year.—*Consular Report.*

Contesting Rate Reductions in Kansas.

On December 20, the Railway Commission of Kansas, using as a basis rates in states of comparatively dense traffic, ordered a reduction of 5 per cent. in grain rates from all points in the state to Atchison and Kansas City, Kan. On December 21 an order was issued for a reduction of 1 mill a ton mile in rates on lump coal from the principal coal fields, except where the existing rate was not in excess of 7 mills a ton mile or 50 cents a ton to destination. Considerable reductions were made in carload rates on syrup, hardware and paper, and in less than carload rates on coffee, sugar, beans, canned goods and syrup from Wichita, Hutchinson, Salina, Independence and Coffeyville. Substantial reductions in salt rates accompanied the placing of those rates on a distance basis, and other cuts threaten to follow. Representatives of Kansas lines, having decided that the reduced rates did not net a fair return upon the capital invested, decided at a meeting on January 17 to carry their case to the courts. As proof of the confiscatory character of the present reductions and of similar reductions which might be made in the future each road is preparing at great expense, estimated on one line alone at $10,000, four statements showing gross and net earnings on commodities carried within the state, on all traffic carried across the state. The suits, which have been filed in the United States circuit court at Topeka by the Chicago, Rock Island & Pacific, Atchison, Topeka & Santa Fe, Missouri Pacific, Union Pacific, and practically all other lines operating in Kansas, ask to have the acts of the commissioners and the laws giving them authority to fix rates set aside as null and void because those acts and laws are repugnant to the fourteenth amendment to the constitution of the United States, requiring that no one may be deprived of property without due process of law. The commission having executive, administrative and legislative duties is not a court, and therefore the adjudication of a rate to be unreasonable by such a body, the decision going into effect in thirty days, is not due process of law, and the requirements that a rate once fixed by the commission shall remain in force until changed by it, no provision being made for a rehearing, gives that body arbitrary power.—*Kansas City Journal.*

The Trans-Andine Railroad.

The first section of this road, from Santiago to the foot of the Andes, was opened recently. This project was approved by the Chilian Congress in 1903, and the government was authorized to call for bids for the construction of the road on the basis of a guaranty of 5 per cent. interest on the cost of the work. The total amount of the bids was $6,750,000. The contracts for the work were divided between Clark & Co., and S. Pearson & Son, of London, and William R. Grace & Co., of New York, and were formally accepted by the Chilian government on June 9, 1904. The line will shorten the time to Buenos Ayres by six hours.

The Nub.

A press despatch from Chicago quotes the representative of the General Managers' Association as saying:

"The nub of the railroads' contention is that rate regulation will be in the hands of men not qualified to exercise such great power without damage and danger to the railroads and the country. Control of rates is too much power to be entrusted to any body of men. But a rate regulation measure of some kind will become a law and the railroads are concentrating their efforts not to defeat the President's program, but to secure the most favorable legislation.

"It is generally supposed that the essential objection to all the bills introduced is the maximum rate clause, giving the proposed bureau power immediately to enforce its rulings. That is a very objectionable feature, but not as bad as the failure of these bills to provide for the right kind of a bureau, because in the last analysis Congress itself cannot deprive the railroads of their constitutional rights of appeal by injunction. The injunction is an unpopular instrument, however, and there should be some means of staying the enforcement of maximum rates other than that of injunctions.

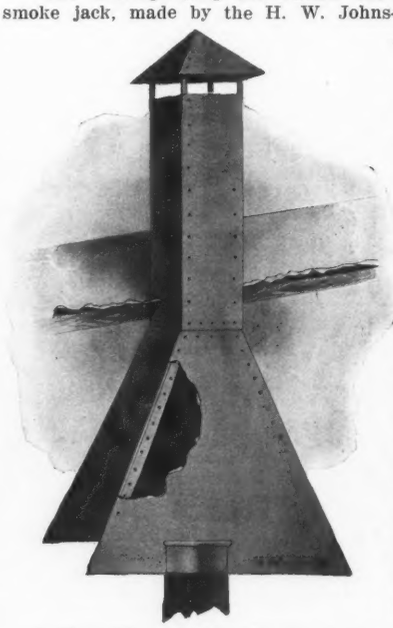
"The worst feature of the Hepburn bill is that nothing is said of the personnel of the interstate commission. It would seem incongruous to pay an interstate commissioner more salary than a supreme court chief justice gets. But even though salaries sufficient to get the right men be provided, what assurance is there that the right men will be chosen? The last selections of commissioners were by no means happy ones. One of them was outrageous."

Iron and Steel in Canada.

The year 1905 has been prosperous for the iron and steel industries in Cape Breton. The output of pig iron was 162,000 tons, and of steel 163,500 tons; of 80-pound rails since June, 1905, 44,000 tons, and rods for the year 47,100 tons. The balance of the steel output has been made into blooms and billets, most of which material has found a market in Canada. A shipment of 30 tons of rails has been made to the Boston Elevated Railway for experimental purposes on the sharp curves of that road. During the year two blast furnaces were continuously in operation, and in November a third was placed in use. The Nova Scotia Steel and Coal Company (Ltd.), had a prosperous year, with an output of 120,000 tons of coke, 58,000 tons of pig iron, and 22,000 tons of steel.—*Consular Report.*

Fire and Acid Proof Smoke Stacks.

The accompanying illustration shows a "Transite" asbestos smoke jack, made by the H. W. Johns-Manville Co., New York. These jacks are made of "Transite" asbestos lumber, which material is absolutely fire, gas and weather proof. It weighs about one-fifth as much as cast-iron, can be worked and handled in the same manner as wood, and can be adapted to various slopes and conditions. A number of large railroads, it is claimed, have already adopted these jacks.



A Transite Asbestos Smoke Jack.

The material from which the jacks are made has a large field of usefulness, not only in railroad work but in every line of construction. It was originally designed for fireproofing flooring and insulation of electrically propelled cars, and was first used by the Interborough Rapid Transit Company, of New York City, both in their elevated and subway cars. The lumber, as its name indicates, is made of asbestos, varying in thickness from ⅛-inch to 1-inch, and is offered in standard size sheets of 40 inches by 40 inches or 42 inches by 48 inches.

Refrigerator Cars in Arkansas and Georgia.

All of the strawberry shipping associations along the Frisco lines in Arkansas have received notice during the last few days that the Armour Refrigerator Company will make no contract with the Frisco this year, and will withdraw all its refrigerator cars from service on that road. It is thought probable that the Frisco will use Rock Island refrigerator cars. These are said to be good ones, but the test will come when the season is at its height, when icing and inspection are the necessary points for success. While there has been much complaint along the Frisco that the Armour charges for icing were too high, there has been little or no complaint as to the quality of the service rendered. * * * If the new service proves satisfactory the retirement of the Armours will not be regretted.—*Memphis Commercial Appeal.*

Senator Clay, of Georgia, has presented in Congress a petition of the Fruit Growers' Association of Marshallville and Montezuma, Georgia, praying for the enactment of legislation which will place the private car lines under the control of the interstate commerce commission. This petition is a radical departure from the general run of the fruit growers' addresses to Congress, the majority of which in the past few months have been asking Congress to let the private car lines alone. It has been strongly suspected, however, that agents of the private car lines have secured the former petitions through promises and threats and altogether against the wishes of the fruit growers.—*Atlanta Journal.*

An Instrument of Transportation.

"While sitting in the smoking room of a sleeper the other day between Porfirio Diaz and Torreon, I was introduced to a familiar character, a Chinaman named Foonchuck. He is naturalized, wears short hair and talks better English than a great many Americans. He owns all the railway eating houses between Diaz and the City of Mexico, and is estimated to be worth over a million in gold. He came to Mexico from California 20 years ago, with less than $20, and went to work as cook for the railway construction company. He now owns three truck farms and raises all vegetables used in his line of hotels. He also owns a farm of 11,000 acres in the state of Tamaulipas. He employs 100 Mexicans and 25 Chinese coolies. He says the average pay to the Mexicans is 44 cents a day, and the Chinese 75 cents. When I asked him why he paid the Chinese more than the Mexicans, he said he could work the Chinese 18 hours a day if necessary, and that it was like pulling teeth to get four hours a day out of the peons. He says the peons live on 72 cents a week."—*Hobart (Ok.) News.*

The Railroad Literary Bureau in Chicago.

"The railroad campaign is in the hands of President Spencer, of the Southern Railway, who is looking after things in Washington. The literary section, so-called, began business last May and has cost about a quarter of a million dollars. Formerly there were eight men on the staff. Now I am doing what little is to be done. We circulated scores of documents—statistics, arguments, addresses, etc., and millions of copies of them. We sent out 10,000,000 copies of the little circular, 'What are the facts?' * * * Our next campaign will be in connection with the 2-cent fare agitation in many of the western states. I do not think the railroads will have much difficulty defeating such measures." The 2-cent fare agitation is worst in Ohio, Indiana, Illinois, Michigan and Iowa.—*Slason Thompson.*

Manufacturing and Business.

The Miller-Collins Co., Constructing Engineers, will, after February 15, occupy its new offices in the Columbia building, 29 Broadway, New York.

Dodge & Day, Mechanical, Electrical and Architectural Engineers, Philadelphia, Pa., will on March 1st move into their new offices in the Drexel Building, Philadelphia.

About 150 Branch Managers and Salesmen of the H. W. Johns-Manville Co., New York, attended the annual convention of the company, which included a banquet at the New York Athletic Club on the evening of February 2.

The American Car & Foundry Company has purchased for its works at Manchester, England, 100 tools consisting of "Boyer" hammers and drills from the Consolidated Pneumatic Tool Company, London, which is a foreign branch of the Chicago Pneumatic Tool Company.

The Pilling Air Engine Co., Detroit, Mich., announces that J. L. Pilling, formerly Vice-President and Sales Manager, severed his connection with the company the first of the year and is no longer concerned in the business in any way. The company is sole owner of Pilling and Kruse patents, Mr. Kruse being the mechanical engineer.

James A. Milne, who has for a number of years been Comptroller of the Allis-Chalmers Company, Milwaukee, has accepted the position of General Manager of Allis-Chalmers-Bullock, Limited, Montreal, Canada, to become effective on or before May 1, 1906. Mr. Milne's place as Comptroller will be filled by L. F. Bower, heretofore manager of the Allis-Chalmers electrical works at Cincinnati.

The Interborough Rapid Transit Company has just given an order to the Electric Cable Company, of New York, for 15 miles of cables insulated with voltax, the new potential insulating compound. This compound, which for the past eight years has been given severe tests, offers advantages over rubber insulation and is rapidly coming into prominence. Recent tests show that this material has withstood high potential insulation, resistance and melting point tests that no other compound yet discovered has withstood. The cost of this material is about 20 per cent. less than rubber insulation.

Iron and Steel.

The Denver, Enid & Gulf is in the market for 50 miles of No. 1 60-lb. relaying rails.

Orders for 50,000 tons of rails recently let include about 30,000 for the New York, New Haven & Hartford, 12,000 for the Pacific Electric, and in the Central states 10,000 for electric roads.

A recent shipment of 5,000 tons of rails for the Harriman lines in Mexico has been delivered at Galveston. It was the first consignment of an order for 14,000 tons for Mexican extensions which was given to Altos Hornos de Bilboa, and is being shipped direct to Galveston from the Spanish port of Bilboa. These rails, it is said, have been shipped direct to Mexico at a saving in price of $5 per ton, under the cost of rails at American mills. The Harriman lines have also ordered from Altos Hornos de Vixcaya, also of Spain, 21,000 tons of rails, which will also be shipped via Galveston for use in Harriman projects. Other large orders are said to be pending with European firms, owing to the better deliveries and better prices obtainable.

The Pennsylvania has placed a supplementary order for 12,500 tons of standard rails with the Cambria Steel Company. This makes the total tonnage 242,500 tons placed by this company for 1906 delivery. Other contracts let include 5,000 tons for the New Orleans Great Northern Railroad; also about 4,000 tons for electric lines, including 2,000 tons for the St. Louis Traction Company, 500 tons for an electric line on the Pacific Coast and 500 tons for an eastern company. Contracts have been let for 2,100 tons of steel for the Brighton Beach extension of the Brooklyn Rapid Transit, and a small order for the Florida East Coast Line, with the American Bridge Company. Twelve thousand tons of plates and structural shapes for lake vessels have been let to the Illinois and Carnegie Steel Companies.

OBITUARY NOTICES.

Alexander B. Coxe, Director of the Lehigh Valley, of Coxe Bros. & Co., and of other companies, died recently in Philadelphia. Mr. Coxe was one of the most influential men in the coal trade.

J. W. Thomas, President of the Nashville, Chattanooga & St. Louis, died in Nashville, Tenn., on February 12. Mr. Thomas was born in 1830, and from 1858 to 1863 was an agent of the Nashville & Chattanooga. For the next two years he was in charge of rolling stock, and then was made Auditor and Paymaster. He was appointed Superintendent in 1868 and General Superintendent in 1872. He was promoted to be General Manager in 1883, and the next year was elected also President. Since 1899 he has been President only.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Engineers' Club of Cincinnati.

At the regular monthly meeting of this club, February 15, a paper was read on "Some of the New Bridges on the Queen & Crescent Route," by A. W. Owen.

International Congress of Applied Chemistry.

The sixth International Congress of Applied Chemistry is to be held in Rome from April 25 to May 3. One of the sections of the Congress is devoted to metallurgy, and among the excursions will be one to the iron works of the Island of Elba. The subscription to the Congress is $4.

Iron and Steel Institute.

The annual general meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers on Thursday and Friday, May 10 and 11, 1906. In place of the ordinary autumn meeting, a joint meeting of the American Institute of Mining Engineers and of the Iron and Steel Institute will be held in London on July 23-29. The Lord Mayor of Lodon has consented to act as Chairman of the London Reception Committee, and will give a Conversazione at the Mansion House on the evening of July 24. The annual dinner will be held in the grand hall of the Hotel Cecil on Friday, July 27. A programme of the visits and excursions to be made during the meeting will be issued when the arrangements are sufficiently matured.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Atchison, Topeka & Santa Fe (Coast Lines).—G. A. Davidson has been appointed Auditor, with office at Los Angeles, Cal., succeeding W. G. Taylor.

Buckhannon & Northern.—W. H. Newman, President of the New York Central & Hudson River, has been elected also President of the B. & N.

Chicago, Cincinnati & Louisville.—F. D. Hodgson, Acting Auditor, has been appointed Auditor.

Colorado Southern, New Orleans & Pacific.—J. H. Lauderdale, Chief Clerk to the Vice-President, has been appointed Assistant to the Vice-President.

Colorado Springs & Cripple Creek District.—The office of Frank Trumbull, President, has been removed from Denver, Colo., to New York. A. B. Parker, Vice-President of the Colorado & Southern, has been elected Vice-President, with office at Denver,

succeeding J. M. Herbert. J. S. Mackie has been elected Secretary, with office at New York.

Denver, Northwestern & Pacific.—D. H. Moffat is President; W. G. Evans, Vice-President; Thomas Keely, Treasurer, and F. B. Gibson, Secretary. The general offices are at Denver, Colo.

Des Moines, Iowa Falls & Northern.—W. A. Bradford, Jr., President of the Chicago, Cincinnati & Louisville, has been elected also President of the D. M., I. F. & N., with office at Cincinnati, Ohio. G. A. Fernald is Vice-President, with office at Boston, Mass. G. A. W. Dodge is Secretary and Treasurer, with office at Iowa Falls, Iowa.

East Tennessee & Western North Carolina.—F. P. Howe has been elected President, with office at Philadelphia, Pa., succeeding R. F. Hoke, resigned. G. W. Hardin, Superintendent, has been elected also Vice-President.

Fort Worth & Denver City.—J. S. Mackie has been elected Assistant Secretary, with office at New York, succeeding H. Bronner, resigned.

Great Northern of Canada.—F. Nicholls has been elected First Vice-President, succeeding James McNaught.

Louisiana & Northwest.—G. W. Hunter, Treasurer, has been elected also President, with office at St. Louis, Mo., succeeding J. J. Nelson, resigned.

Missouri Southern.—F. D. Stout has been elected President, with office at Chicago, Ill., succeeding J. H. Coulter.

New York & Harlem.—M. S. Barger has been elected Treasurer, succeeding W. S. Crane, resigned to engage in other business.

New York Central & Hudson River.—Louis Bender has been elected Assistant Treasurer, succeeding W. A. Greer, resigned to engage in other business.

Peoria & Pekin Terminal.—E. A. Burrill has been elected Vice-President and General Manager.

Richmond, Fredericksburg & Potomac.—W. D. Duke, General Manager, has been appointed Assistant to the President.

Rock Island Company.—James Campbell has been elected Director, Robert Mather, Member of the Finance Committee, and B. F. Yoakum, Chairman of the Board, all succeeding W. B. Leeds, resigned. Mr. Yoakum was also elected a member of the Finance Committee, succeeding Marshall Field, deceased.

St. Louis & San Francisco.—W. B. Leeds has resigned as a Director and member of the Executive Committee.

St. Louis, Rocky Mountain & Pacific.—The officers of this company are as follows: Henry Koehler, Jr., President; T. B. Harlan, Vice-President, both with offices at St. Louis, Mo.; J. H. Thompson, Vice-President and Consulting Engineer, with office at New York; J. van Houten, Vice-President and General Manager, with office at Raton, N. M.; C. Springer, Treasurer, with office at Cimarron, N. M.; H. P. Roseberry, Assistant Treasurer; A. H. Officer, Secretary and Auditor, both with offices at Raton, and W. H. Irvine, Assistant Secretary, with office at New York.

Tennessee.—H. S. De Vault has been appointed Auditor, with office at Oneida, Tenn.

Tionesta Valley.—F. K. Bradley, Assistant Treasurer, has been elected Treasurer.

Toledo & Western.—C. M. Stone has been elected President, succeeding Luther Allen, deceased.

Tonopah & Goldfield.—W. W. Keith, Assistant Treasurer, has been appointed Auditor, succeeding T. Thornton, deceased. W. L. Carden succeeds Mr. Keith.

Operating Officers.

Annapolis, Washington & Baltimore.—J. G. Masterton, Secretary and Treasurer, has been appointed General Manager, with office at Baltimore, Md.

Atchison, Topeka & Santa Fe.—C. H. Gaunt, Superintendent of Telegraph, has been appointed also Assistant General Manager, with office at Topeka, Kan.

Atlantic & Birmingham.—C. B. Wilburn has been appointed General Superintendent, with office at Waycross, Ga.

Central New England.—O. M. Laing has been appointed Assistant Superintendent, with office at Hartford, Conn.

Chicago, Burlington & Quincy.—See Michigan Central.

Cincinnati, Hamilton & Dayton.—J. W. Anderson has been appointed Superintendent at Wellston, Ohio, succeeding T. A. Sweeney, transferred. J. M. Scott has been appointed Superintendent at Indianapolis, Ind., not at Wellston, as formerly reported.

Indiana Harbor.—F. T. Bowles, who was recently appointed Superintendent of this road, began railroad service in 1878 as a messenger in the office of the Master Mechanic of the Pittsburg, Cincinnati, Chicago & St. Louis, at Logansport, Ind. After three years he went to the Chesapeake & Ohio, where he served successively as locomotive fireman, engineman and conductor. In 1893 he went to the Chesapeake & Ohio Southwestern, now part of the Illinois Central, where, after five years, he was made road foreman of engines. In 1900 he went to the Lake Erie & Western in the same capacity, being appointed Superintendent of the Fort Wayne division of that road in 1902. The next year he was transferred to the Peoria division, where he was at the time of his recent appointment.

Lake Shore & Michigan Southern.—D. C. Moon, General Superintendent, has been appointed Assistant General Manager, succeeding E. A. Handy, promoted. H. A. Worcester, General Superintendent of the Michigan Central, succeeds Mr. Moon.

Michigan Central.—H. C. Nutt, General Superintendent of the Missouri district of the Chicago, Burlington & Quincy, has been appointed General Superintendent of the Michigan Central, succeeding H. A. Worcester. See Lake Shore & Michigan Southern.

Missouri, Kansas & Texas.—J. W. Walton, Superintendent at Denison, Texas, has been appointed Superintendent at Parsons, Kan., succeeding C. L. Harris. W. E. Williams succeeds Mr. Walton.

Ohio River & Western.—W. R. Crumpton has been appointed General Manager, succeeding J. K. Geddes, assigned to other duties.

Quebec Central.—J. H. Walsh, General Freight, Passenger and Baggage Agent, has been appointed General Manager.

Richmond, Fredericksburg & Potomac.—C. W. Culp, Assistant General Manager, has been appointed General Superintendent. The offices of General Manager, Assistant General Manager, and Superintendent have been abolished.

Santa Fe Central.—S. B. Grimshaw, General Manager, Assistant to the President, and General Freight and Passenger Agent, will also perform the duties of Car Accountant, hitherto under the charge of C. W. Fay.

Seaboard Air Line.—J. M. Shea, Trainmaster at Richmond, Va., has been appointed Superintendent of the Sixth division, with office at Jacksonville, Fla.

Tionesta Valley.—P. M. Newman, Traffic Manager, has been elected General Manager, and the office of Traffic Manager has been abolished.

Traffic Officers.

Chicago, Cincinnati & Louisville.—T. C. Beyland has been appointed Acting General Freight Agent, with office at Cincinnati.

Chicago, Rock Island & Pacific.—S. H. Johnson, Assistant General Freight Agent at Little Rock, Ark., has been transferred to Chicago.

Des Moines, Iowa Falls & Northern.—S. L. Straus has been appointed General Freight and Passenger Agent, with office at Des Moines, Iowa.

Georgetown & Western.—A. Campbell has been appointed General Freight and Passenger Agent, with office at Georgetown, S. C.

Great Northern.—H. S. Jones has been appointed Assistant General Freight Agent at Seattle, Washington.

La Crosse & Southeastern.—A. L. Eidemiller has been appointed General Freight and Passenger Agent, with office at La Crosse, Wis., succeeding H. L. Chadwick, resigned.

Quebec Central.—E. O. Grundy has been appointed General Freight and Passenger Agent, succeeding J. H. Walsh, promoted.

White Pass & Yukon.—J. H. Rogers has been appointed Traffic Manager, with office at Vancouver, B. C., and Skaguay, Alaska.

Engineering and Rolling Stock Officers.

Atlanta & West Point.—W. N. Cox, Superintendent, has been appointed Superintendent of Transportation and Machinery, with office at Montgomery, Ala., and the office of Superintendent has been abolished.

Chicago, Anamosa & Northern.—D. M. McKey, Chief Engineer, has resigned.

Chicago, Cincinnati & Louisville.—J. K. Sroufe has been appointed Engineer of Maintenance of Way, with office at Peru, Ind. Geo. Dickson has been appointed Master Mechanic, with office at Peru, Ind.

Erie.—C. H. Morrison, formerly Signal Engineer, has been appointed Acting Electrical Engineer, with office at New York.

Lehigh Valley.—J. N. Mallory, formerly in the Department of Tests of the New York Central, has been appointed Mechanical Engineer of the Lehigh Valley, succeeding L. L. Bentley, resigned.

Ohio River & Western.—J. K. Geddes, General Manager, has been appointed Chief Engineer in charge of construction. J. F. Scott has been appointed Master Mechanic at Zanesville, Ohio, succeeding V. B. Stubbins.

LOCOMOTIVE BUILDING.

The Lehigh & Hudson is in the market for six locomotives.

The Virginia & Carolina Coast has ordered seven locomotives from the American Locomotive Co.

The Marion & Rye Valley, Marion, Va., has ordered one 16-in. x 24-in. 10-wheel locomotive from the Lima Locomotive & Machine Co.

The Burrs Ferry, Browndell & Chester, Houston, Texas, has ordered one 37-ton and one 45-ton Shay locomotive from the Lima Locomotive & Machine Co.

The Genesee & Wyoming has ordered one simple Mogul locomotive from the American Locomotive Company for April, 1906, delivery. This locomotive will weigh 110,000 lbs., with 95,000 lbs. on drivers; cylinders, 18 in. x 24 in.; diameter of drivers, 50 in.; straight top boiler with a working steam pressure of 170 lbs.; total heating surface, 1,530 sq. ft.; 240 tubes, 2 in. in diameter by 11 ft. 2 in. long; firebox, 96 in. x 34½ in.; grate area, 22.9 sq. ft.; tank capacity, eight tons of coal and 4,000 gallons of water. The special equipment will include Westinghouse air-brakes, Nathan injectors, and sight-feed lubricators.

CAR BUILDING.

The Kanawha & Michigan is receiving bids for additional rolling stock.

The Norfolk & Southern is in the market for 300 box and 50 flat cars.

The Danbury & Harlem Traction Company will soon order additional cars.

The Columbus & Lake Michigan is in the market, it is reported, for freight equipment.

The Portland & Rumford Falls has ordered 25 flat cars from the Pressed Steel Car Co.

The Cumberland Railway & Coal Co. has ordered 100 coal cars from Rhodes, Curry & Co.

The Canadian Pacific has ordered 200 steel coal cars from the Dominion Car Co., of Canada.

The Long Island, it is reported, is about to place orders for upwards of 60 passenger cars.

The Western Maryland is in the market for 13 passenger cars and additional freight equipment.

The Union Railroad has ordered 500 hopper cars of 100,000 lbs. capacity from the Pressed Steel Car Co.

The Mexican Central is in the market for upwards of 1,500 stock and box cars of 60,000 lbs. capacity each.

The Wells Fargo Co., New York, has ordered 10 express cars from the American Car & Foundry Company.

The Ingoldsby Automatic Car Company, St. Louis, Mo., it is reported, is asking bids on a large number of dump cars.

The Birmingham Paint & Roofing Co., Birmingham, Ala., has purchased one tank car from O. R. Whitney, New York, for immediate delivery.

The Hocking Valley, as reported in our issue of February 9, has ordered 12 coaches, eight baggage cars and two parlor cars from the Pullman Co.

The Nevada Northern, San Francisco, Cal., is in the market for 10 steel hopper ore cars. It has already asked for proposals from several car builders.

The Midland Valley, in addition to the four cabooses reported as ordered from the Mt. Vernon Car Company, in a previous issue, has, it is reported, ordered 300 gondola cars of 80,000 lbs. capacity from F. M. Hicks & Co.

The Mississippi Central has ordered 40 Hart convertible cars of 80,000 lbs. capacity from the Rodger Ballast Car Co. for May and August, 1906, delivery. These cars will measure 36 ft. long and will be equipped with Westinghouse brakes, Tower couplers, Common Sense bolsters and Miner tandem draft rigging. It is also reported that this company has ordered upwards of 200 freight cars, to be built in its own shops.

The Fairmont Coal Co., Baltimore, Md., has ordered 3,000 composite hopper coal cars of 100,000 lbs. capacity each, from the South Baltimore Steel Car & Foundry Co. These cars will be fitted with steel underframes; 2,000 will be used by the Fairmont Coal Co., and 1,000 by the Somerset Coal Company. The aggregate cost of these cars is between three million and three and a half million dollars. Delivery is to begin in May.

The Los Angeles & Redondo is building 10 interurban cars and 10 flat cars of 80,000 lbs. capacity at its Redondo shops. The interurban cars will be 44 ft. 6 in. long and 8 ft. 3 in. wide, over all. The special equipment will include: Jones & Laughlin axles, Westinghouse air-brakes, Keeler curtain fixtures, Pantasote curtain material, Sherwin-Williams paint, Monitor roofs, Heywood Bros. & Wakefield seats and Griffin wheels. The flat cars will be 40 ft. long, 9 ft. wide and 4 ft. 2 in. high, over all. The special equipment will include: Jones & Laughlin axles, Simplex bolsters and brake-beams, Tower couplers, Miner draft rigging, McCord journal boxes, Farist Steel Co.'s springs and Griffin wheels.

The Norfolk & Western, as reported in our issue of Feb. 2, has ordered 2,500 hopper bottom class H J gondola cars of 100,000 lbs. capacity from the South Baltimore Steel Car & Foundry Co., and 1,000 drop bottom class G I gondola cars of 100,000 lbs. capacity from the Western Steel Car & Foundry Co. The class H J gondola cars will weigh 38,000 lbs. and measure 34 ft. 6 in. long, 9 ft. 6 in. wide and 10 ft. ½ in. high, over all. The class G I gondola cars will weigh 38,100 lbs., and measure 38 ft. 2½ in. long, 8 ft. 11½ in. wide and 4 ft. high, inside measurements. The special equipment for both includes Norfolk & Western standard brake-beams, Christie brake-shoes, Westinghouse air-brakes, Ajax brasses, Major couplers and Butler draft rigging for G I cars, Major and Melrose couplers for H J cars, McCord journal boxes, Railway Steel Spring Co.'s springs, and "Diamond" trucks.

BRIDGE BUILDING.

BIRMINGHAM, ALA.—The Board of Revenue is planning to build a steel bridge over the Warrior river, to cost $20,000.

CARLYLE, ILL.—Bids are wanted February 15 by H. H. Santel, at Trenton, for building a bridge. B. J. Rensing is County Clerk.

CITY OF MEXICO, MEXICO.—Engineers of the National of Mexico have reported favorably on the proposition to build a bridge over the Rio Grande River at Metamoras to connect with the St. Louis, Brownsville & Mexico railroad at Brownsville, Texas. Its cost is estimated at about $500,000.

COLORADO SPRINGS, COLO.—Bids will be asked this spring by the Board of County Commissioners for putting up a bridge 75 ft. long, over Fountain creek, in El Paso County. The proposed structure, if built of concrete, will have two spans, and if of steel only one span. Henry McAllister is Deputy County Clerk.

KEARNEY, NEB.—Bids are wanted February 27 by E. H. Miller, County Clerk, for building all the bridges that may be needed in Buffalo County for one year.

MARYVILLE, TENN.—A committee has been appointed to determine when bids shall be asked for building a bridge over Little river, near Rockford, in Blount County, Tenn. C. F. Broady can give information; Clay Cunningham is County Clerk.

MENASHA, WIS.—The Chicago, Milwaukee & St. Paul is building a steel bridge, 100 ft. long, at a cost of $15,000, over the river at this place.

MINNESOTA.—On Feb. 7 a bill was introduced in the House of Representatives and referred to the Committee on Interstate and Foreign Commerce, authorizing the Wisconsin & New Duluth Bridge Co. to build a bridge across the St. Louis river between the states of Wisconsin and Minnesota.

MONTICELLO, GA.—Bids are wanted this spring by E. H. Jordan for building a steel or wood bridge, 800 ft. long, over Murder creek, in Jasper County.

MONTREAL, QUE.—Bids are wanted by the Grand Trunk Pacific, March 12, for building a steel bridge at Cap Rouge.

OTTAWA, ONT.—Application will be made to the Dominion Parliament for the incorporation of the Minnesota-Canadian Bridge Company to build a highway bridge over the Rainy river at Pitchers' Point.

Owensboro, Ky.—The Chicago, Indianapolis & Evansville is making plans for building a bridge on the line of its proposed road over the Ohio river, at this place.

Paris, Ont.—The overhead steel bridge to be built by the Grand Trunk Railway will be commenced early in the spring.

Pembroke, Ont.—The following bids were received for the construction of the Clay Bank bridge: Substructure, low level and high level—Bourke & Wilson, $14,308—$16,490; Moran & Lynn, $11,730—$13,497. For the superstructure: Dominion Bridge Co., $10,470—$14,225; Dickson Bros., $13,453—$16,737; Locomotive & Mach. Co., $17,370—$16,640. Contract awarded to Dickson Bros., of Campbellford, for the complete bridge, at $22,022.

Pine Bluff, Ark.—Bids will soon be asked by the Bridge Commissioner for building a steel bridge over the Arkansas river in Jefferson County. E. J. Kerwin, County Judge, is Chairman; Jesse R. Core is County Clerk.

Richmond, Va.—The Richmond & Chesapeake Bay Railway will build a viaduct 2,900 ft. long on its proposed road from this place north to Ashland. C. P. E. Burgwyn, Mutual Building, Richmond, is Chief Engineer.

Roswell, N. Mex.—The Chicago, Rock Island & Pacific, it is said, will build a bridge here.

St. Paul, Minn.—The Northern Pacific will build two bridges on the line of its proposed cut-off to Portland, Ore. The plans for the main bridge over the Columbia River and slough call for 17 spans with a total length of 3,540 ft. There will be six spans of 265 ft. each over the Columbia slough and nine spans 169 ft. each over the Columbia River on the Washington side, with a river draw 465 ft. long, allowing 200-ft. channels on each side of the pivot pier. This bridge and the one to span the Willamette will cost $3,000,000. Both bridges will be double-tracked. The Willamette bridge will have 21 concrete or stone piers, including the old pivot pier built by the Union Pacific in the Columbia River in 1889 which will be utilized by the Northern Pacific. The large steel bridge at Bismarch, N. Dak., for the Northern Pacific has just been completed.

St. Thomas, Ont.—For the proposed subway under the Michigan Central tracks at Ross street the road will erect the retaining walls and abutments and street and bridge work, while bids for excavating, paving, etc., will be asked for by the city.

Seebert, W. Va.—Bids are wanted March 6 by S. L. Brown at Marlinton, County Clerk, for building a steel bridge 40 ft. long over Stamping creek in Pocahontas County.

Victoria Harbor, Ont.—The Canadian Pacific will build terminals here. In connection with its proposed line from this place to Peterboro, three overhead bridges will be built at crossings of the Grand Trunk.

Waynesville, N. C.—Bids will be asked this spring by W. N. Noland for building an iron bridge 200 ft. long over Pigeon river, in Haywood County.

Other Structures.

Athens, Ga.—The Gainesville Midland has bought a site on which it will build new freight terminals.

Cleveland, Ohio.—According to newspaper reports officers of the Pittsburg & Lake Erie, the Baltimore & Ohio, the Wabash, and the Erie Railroads have reached an agreement and completed the plans for jointly putting up a union passenger station here to cost about $2,500,000. An option has been taken for a site.

Dallas, Texas.—According to the newspapers, plans are being made to at once put up a union passenger station and terminal. The arrangements are in the hands of Messrs Yoakum & Conner.

Jacksonville, Fla.—The Seaboard Air Line, it is said, will soon start work on extensive improvements in its freight yards here. The plans call for the building of two brick warehouses and the elevation of the yard to secure better drainage.

Justus, Ohio.—The Sugar Creek & Northern, which is part of the Wheeling & Lake Erie, will build shops at this place on its proposed line from Bolivar to Orrville.

New Westminster, B. C.—The Vancouver, Westminster & Yukon is planning to build large wharves and docks at this place.

Niagara Falls, N. Y.—The New York Central instead of enlarging its roundhouse at this place, it is said, will build a new one to hold 75 engines, and will also enlarge its yards.

Opelousas, La.—The Colorado Southern will build a new passenger station, and also a freight house, at this place.

Quebec, Que.—The improvements to be made here by the Canadian Pacific include crib work from Prince Edward street to connect direct with the north wall of the Louise docks, and two freight sheds, one 40 x 90 ft. and the other 60 x 90; also a new station.

Winnipeg, Manitoba.—The freight sheds of the Canadian Pacific at this place, recently damaged by fire at a loss of $40,000, will be rebuilt this spring.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Abilene Railroad.—This company has filed a charter in Texas with a capital of $200,000 to build a railroad from Hamlin, in Jones County, Tex., to Brady, about 100 miles; also to build a branch line from Anson to Stamford, 15 miles. The office of the company will be at Abilene. The incorporators include E. S. Hughes, W. G. Swenson, H. James, of Abilene; B. W. Fonts and C. C. Sanford, of Fort Worth, and others.

Albuquerque & Eastern.—Announcement is made that this company is to be built at once from a point on the Santa Fe Central to Albuquerque, and that the branch line to the Hagan coal fields will be completed within the next twelve months.

Apalachicola & Northern.—A contract is reported let to Richard Morey, of St. Louis, for building this company's proposed road from Apalachicola, Fla., to River Junction. Work has been begun at each end of the line, which will be about 83 miles long and will pass through a rich timber section. R. V. Coleman, formerly of the Georgia, Florida & Alabama, is General Manager.

Big Fork & Northern (Minnesota & International).—An officer writes that this road has been completed from North Home via Mizpah, Gemmell and Margie to Ripple, a distance of 31.3 miles. A. Guthrie & Co., of St. Paul, Minn., were the contractors.

Birmingham & Southwestern.—Application has been made by a company under this name, in Mississippi, with a capital of $5,000,000, to build a railroad from Birmingham, Ala., via Hattiesburg, Miss., to Baton Rouge, La. Incorporators include: Former Governor A. H. Loningo, former Secretary of State J. J. Coleman, A. J. Hackett, of Jackson, Miss.; G. G. Gibson, of Birmingham; J. C. Dunlap, of Chicago; R. C. Oliver, of Hattiesburg; E. F. Ballard, of Waynesboro, Miss., and others.

Buffalo Subway.—Incorporation has been granted a company under this name, with a capital of $1,000,000, to operate an electric line through subways in the city of Buffalo, N. Y. The proposed route is from a point on Carolina street to the grounds of the New York Central & Hudson River, thence easterly beyond the city line to a point about 2,000 ft. beyond the Terminal Railroad of Buffalo, in the town of Cheektowaga, with a branch from the main line, at William street and Fillmore avenue to the intersection of Curtiss and Lovejoy streets. The directors include: Albert W. Bonynge and T. B. Chancellor, of Hoboken, N. J.; F. B. Bard, H. Peick, R. P. Peck, E. McInness and H. M. Spencer, of New York city, and F. S. McGraw and W. B. Cutler, of Buffalo.

California Roads.—According to Western papers, E. H. Harriman, A. W. Foster and E. P. Ripley, of the Sante Fe, have agreed upon a general plan for railroad extension into the northern territory. A new company is being organized, which is to take over the San Francisco & Northwestern (A., T. & S. F.), with its valuable Eureka terminals, also to take over Harriman and Foster's California & Northwestern line between Willits and Tiburon and San Francisco, and probably the North Shore road; and also to build 100 miles of road from a point north of Willits to the southern end of the San Francisco & Northwestern road, 31 miles south of Eureka. The proposed new company will form the nucleus of a northwestern California system, which, besides giving Eureka a rail outlet, will eventually extend along the coast to Portland, Ore., forming two trunk lines between Los Angeles and Portland. The immediate object of Messrs. Harriman, Foster and Ripley in wanting a joint rail line to Eureka, it is said, is to build up a big lumber traffic from the red wood forests.

Canadian Pacific.—Bids for track-laying, bridging and ballasting the Sudbury branch of this road between Romford and French River Crossing (40 miles), are wanted March 10 by J. W. Leonard, Manager of Construction, 112-118 King street, West, Toronto.

An officer writes that bids have been asked for extending the Manitoba & Northwestern section of this road from the present terminus, at Sheho, northwest, a distance of 16 miles, and thence west 27 miles.

This company has extended its Wetaskiwin branch on the Western division of its road from Camrose, Alberta, east to Daysland, 25.5 miles. On the same division the Lacombe branch has been extended from Alix, Alberta, east to Stettler, 24.4 miles.

Chesterfield & Lancaster.—An officer writes that grading has been commenced by A. H. Page & Son, who have the contract for building this proposed road from Ruby, S. C., via Hornsboro and Dudley to Lynches river, 18 miles. A. H. Page, of Cheraw, S. C., is President, and C. H. Scott, of Ruby, is Chief Engineer.

CHICAGO, MILWAUKEE & ST. PAUL.—A contract is reported let by this company to H. C. Henry for building that section of its Pacific coast extension which is to extend from Puget Sound to the eastern boundary line of the State of Washington. Contracts have already been given to MacIntosh Brothers, of Milwaukee, for building westward from the present terminus in South Dakota.

DELAWARE & HUDSON.—This company proposes to build a line around Wilkesbarre, Pa., to relieve the pressure on the tracks in the city and to secure more favorable grades.

GRAND TRUNK PACIFIC.—Bids are wanted by F. W. Morse, of Montreal, General Manager of this company, for building the section of the proposed road from Touchwood Hills to Edmonton, Alberta, about 450 miles. Application has been made to the Dominion Parliament by the company to organize the Grand Trunk Pacific Branch Lines Company, with authority to build branch lines as follows: From Moncton to Halifax; from the main line to St. Johns, N. B.; from various points on the main line to Montreal, to Ottawa and to North Bay; from the main line on the northeast of Fort William to a junction with the Grand Trunk north of Toronto, with the privilege of building a line to Sault Ste. Marie or Sudbury; from Winnipeg to the boundaries of Manitoba; from Brandon to the Grand Trunk Pacific main line, and to the international boundary; to Calgary from the G. T. P. main line; to Yorkton, Regina, Prince Albert, Battleford, Dawson City and Hudson Bay; from Calgary to the international boundary; from Vancouver to the Grand Trunk Pacific main line, and to a junction with the Pacific Northern and American Railway; and from the north shore of Vancouver Island south, or southeast along the west side of the island to Victoria. The company also asks for authority to operate its own steamships and hotels, and to develop water power along the lines of its various roads.

Bids are wanted by this company, March 12, at the office in Ottawa, for building a section of its proposed road from Winnipeg to Superior Junction, and from Quebec to St. Maurice, the work to be completed by September 1, 1907.

IOWA TRANSFER.—An officer writes that this company, recently incorporated in Iowa, proposes to build a clearing yard in Des Moines for the purpose of expediting the interchange of car load freight between the various roads in that city. C. F. Hubbell is President; T. G. Ross, Vice-President; J. A. Wagner, Secretary and Treasurer. The company will not let any contracts, but will do the work with its own forces. The plans include the laying of two miles of track. This will be built early this spring. (January 26, p. 29.)

MEXICAN ROADS.—William Niven, an American of Balsas, state of Guerrero, Mexico, is promoting the organization of a company to build a railroad from Balsas down the valley of the Balsas river to Cayuca de Catalan, a distance of about 100 miles, through a section rich in mineral resources.

Surveys have been completed for a railroad which Carlos Romero, of Guadalajara, Mexico, will build from Taquesquite, state of Jalisco, to his mines. Contracts for the work will soon be let. Mr. Romero also owns a concession which he obtained from the federal government for the construction of a railroad from Etzatlan to Hostotipaquillo, in the same state.

MONONGAHELA SOUTHERN.—This company has given a contract to Foley Brothers for building a line seven miles long to connect with the Wabash-Pittsburg Terminal. The company is building a yard at the point of connection with the W. P. T., to hold 2,000 cars, and expects to have it completed by May of this year.

MORGAN'S LOUISIANA & TEXAS.—An officer writes that this company, which has completed grading for about one mile, at La Fayette, and one-half mile at Port Allen on its proposed extension from LaFayette, La., to Baton Rouge, asked for bids February 7 for building from LaFayette via Vuaux and Rosedale to Port Allen, La., 54.4 miles. The work includes the building of seven or eight bridges, the largest of which will be at the Chafalaya river. This is to have a 300 ft. draw span and a 200 ft. fixed span. C. G. Vaughn, 511 Natchez street, New Orleans, is Construction Engineer.

NORTH COAST.—This road is projected to run northwest across the State of Washington from Walla Walla, to Seattle. Most of the right of way has been bought and the necessary terminal facilities secured. The new road will be a considerable distance south of the proposed extension of the St. Paul to the Pacific coast. Its nearest point to that line will be probably in eastern Washington, where the North Coast will pass to the south of the Rattle Snake Mountains, while the St. Paul extension will run immediately to the north of these mountains.

PITTSBURGH & LAKE ERIE.—Contracts are reported let by the Vanderbilt interests to build a railroad from Beaver, Pa., to East Liverpool, O., 24 miles, with the intention of ultimately extending the line to Steubenville, O.

RICHMOND & CHESAPEAKE BAY.—This company, which has let contracts for building 10 miles of its proposed road from Richmond, Va., to Ashland, 15 miles, will have one viaduct 2,900 ft. long. Additional contracts will soon be let for building the remainder of the road. The company is planning also to build an extension from Ashland to Tappahannock. (December 22, p. 201.)

ROCHESTER, SCOTTSVILLE & CALEDONIA (ELECTRIC).—A charter has been granted this company in New York State, with a capital of $500,000, to build an electric railroad from Rochester, N. Y., to Caledonia in Livingston County. Among the directors are H. U. Brewster, J. N. Beckley and Senator Morton Lewis, of Rochester.

SAN FRANCISCO, IDAHO & MONTANA.—Work is reported already under way on this proposed road from Boise, Idaho, to Winnemucca, Nev. The proposed road passes through a rich timber section. An agreement has been made between the railroad and the city of Boise by which the road is to secure the right of way and a bonus of $250,000, half of which is to be paid on the completion of that portion of the proposed road from Boise over the Snake river, a distance of about 50 miles, and the balance when the road has reached San Francisco, 625 miles, either by direct line or by satisfactory connection at Winnemucca. The Pacific Construction Company, which is doing the work, has already 40 miles of ties laid, and has 3,000 tons of rails.

SEABOARD AIR LINE.—The Tallahassee Southeastern branch of this company has been opened from Tallahassee Southeast Junction, a point about three miles south of Tallahassee, Fla., south to Wacissa, a distance of 20 miles.

SEWARD PENINSULA.—This company, which is being financed by New York and Nevada capitalists, and which was organized under the charter of the Nevada Trust Company, proposes to build during the coming summer a line from Nome, Alaska, to Kougarok, a distance of 125 miles.

TEXAS CENTRAL.—An officer writes that a contract has been let to J. H. Owens, of Galveston, Texas, for building the proposed extension from Stanford, Tex., to a point 44 miles west, and that the contract called for the beginning of work by February 10. The work includes the building of one 75-ft. bridge. (January 5, p. 8.)

VIRGINIA & CAROLINA COAST.—Contracts are reported let by this company to the Hedges-Gosney Construction Company, and to the Farratt Construction Company, of Springfield, Mo., for building its proposed line from Roanoke, Va., south 123 miles. More than 20 miles of the line will be over water ways, covered either by trestles or by transfer boats.

WABASH PITTSBURG TERMINAL.—An officer writes that this company is building a branch from Long View, Allegheny County, Pa., to Millers Grove, four miles, for which a contract has been let to J. G. Corcoran & Co. Connection will be made at the latter place with the Monongahela Southern, which is owned by the United States Steel Corporation.

WASHINGTON NORTHERN (UNION PACIFIC).—This company, which was recently incorporated in the state of Washington, with $500,000 capital, probably in the Harriman interest, projects a railroad from Portland to Seattle and Everett, crossing the Colorado river at Kelso. The incorporators include: Jacob Furth, J. C. Trenhome and F. K. Stuverne, through the last named of whom extensive lands have been bought. According to the newspapers, negotiations have been completed whereby the Union Pacific has secured at a cost of about $1,000,000, 70 acres of tide lands for railroad terminals at Tacoma, Wash., the company agreeing to build terminals and warehouses within 20 months.

WESTERN MARYLAND.—Connection has been made on the Cumberland extension of this road completing the connection between the Western Maryland and West Virginia Central, and establishing a through line from the West Virginia coal fields to tidewater at Baltimore.

WESTERN TEXAS & GULF.—This company, recently incorporated with a capital of $500,000, proposes to build a railroad from San Angelo, Texas, to Big Springs and to Stanton, with the intention of ultimately extending the road north to Amarillo, Texas. E. H. D. Caston, J. T. Witt and E. P. Speers, all of Dallas; W. P. Edwards and J. W. Pinson, of Big Springs, are interested.

WHEELING & LAKE ERIE.—An officer writes that the line that is to be built in Ohio from Bolivar to Orrville, 22 miles, and known as the Sugar Creek & Northern, is being built to avoid curves and grades in the present line, and to effect a saving of about six miles. Contracts for the work have been let, it is said, to J. C. Carland & Co., of Toledo, Ohio.

This company will soon begin work building a yard at Huron, Ohio, to hold 1,200 cars. Contracts have already been let for building a slip 1,400 ft. long and 200 ft. wide, and for four ore conveyors and car dumpers. The company is now building 20 passing sidings at various points from Jewett to Toledo, to hold 80 cars each. The

company is also extending its yards at Ironville and South Toledo to hold 700 additional cars.

According to newspaper reports, arrangements have been completed for building a branch of this road from Steubenville to Toronto, Ohio, 10 miles, and construction work is to be begun at once. From Toronto the company can easily secure an entrance into East Liverpool. An officer writes denying the report that the company is making surveys for extensions in Greene County, Pa. The engineers have made a number of surveys to secure easier grades and curves, but none of these are now being seriously considered.

Yazoo & Mississippi Valley.—This company is building a line from Helem, Miss., west and north, a distance of 12.8 miles towards Arnold. .Grading is almost completed, and about half the track has been laid.

On the line from Silver City to Kelso grading has been completed for about 20 miles, and track laid for about 10. This line will be about 41 miles long, and will run via Midnight.

This company has completed its extension from Mattson, Miss., south for a distance of three miles.

On the Yarbough-Swan Lake cut-off this company has completed about 12 miles of road south from Yarbough, Miss. The line is projected to Swan Lake, an additional eight miles.

No action has been taken by this company on its projected cut-off from Etter, Tenn., to Lake View, Miss., six and one-half miles.

RAILROAD CORPORATION NEWS.

Baltimore & Ohio.—See Washington Branch.

Canadian Pacific.—A meeting of the stockholders has been called for March 19 to approve an increase in the authorized capital stock from $110,000,000 to $150,000,000. There is now $101,400,000 outstanding and it is proposed to issue $20,280,000 more as soon as the new $40,000,000 is authorized. Shareholders are to have the right to subscribe to this issue at par at the rate of one share of new stock for every five shares of record of April 20. With Canadian Pacific selling at 174, the rights of this new issue are worth about $15 a share.

The C. P. has sold all its land in the vicinity of Edmonton, Alberta, amounting to about 500,000 acres, to an English syndicate, at a price said to be $4 an acre.

The gross earnings for the six months ended December 31 were $31,381,976, an increase of $4,229,954; net earnings $12,187,399, an increase of $3,042,651. Surplus after charges and dividends was $4,869,816, an increase of $2,417,285.

Colorado & Southern.—Hallgarten & Co., New York, are offering at 93¾ $17,000,000 4½ per cent. refunding bonds of 1935. These bonds are part of a total issue of $100,000,000 authorized last June, when the block above referred to was sold to these bankers. The proceeds of the sale are to be used to refund $8,000,000 of equipment trusts, to buy the Trinity & Brazos Valley, the Colorado & North-western, to build shops, to extend the Trinity & Brazos Valley to the Gulf, and for general additions and improvements.

Cumberland Valley.—See Dillsburg & Mechanicsburg.

Detroit United (Electric).—This company has bought the Detroit, Monroe & Toledo Short line at a price of about $40 per share. The D., M. & T. S. L. operates 50 miles of road from Toledo to Detroit and 4 miles from Monroe, Mich., to Lake Erie. It has outstanding $2,000,000 capital stock and $2,000,000 5 per cent. first mortgage bonds of 1933.

Dillsburg & Mechanicsburg.—The property of this company has been bought by the Cumberland Valley at a foreclosure sale for $50,000. The D. & M. has eight miles of road between Dillsburg Junction, Pa., and Dillsburg, and a two-mile branch. It has been, since 1873, operated by the Cumberland Valley, which holds the total outstanding $100,000 first mortgage 6 per cent. bonds of 1895 of the smaller company. It is said that the road will soon be operated by electricity.

Great Northern.—The 600,000 acres of ore lands belonging to this company are to be developed by a separate organization. The *Wall Street Journal* says that they have been leased to the U. S. Steel Corporation, on terms providing for a rising minimum production beginning with about 3,000,000 tons a year, and that a holding company with $120,000,000 capital will take over the property. The Great Northern Development Company, incorporated in Maine with $100,000 capital, is mentioned in this connection by another paper. It is understood that the stock of the new holding company will be offered to Great Northern stockholders at a figure which will give them valuable rights.

Intercolonial.—The gross earnings for the six months ended December 31 were $3,853,960, an increase of $232,697; the deficit was $71,259, comparing with a deficit of $482,755 at the end of the same period of 1904.

Minneapolis, St. Paul & Sault Ste. Marie.—The gross earnings for the six months ending December 31 were $6,132,668, an increase of $1,492,972; net earnings, $3,451,749, an increase of $987,410.

Missouri, Kansas & Texas.—The $10,000,000 4½ per cent. general mortgage bonds recently sold to Speyer & Co., New York, for $8,750,000, will be used as follows: $4,000,000 for reduction of grades and new alinements from the northern termini to the Red River, Texas, and other improvements; $1,000,000 for rail renewals, and the remainder to pay off equipment notes which would otherwise have to be paid out of future net earnings. (Jan. 26, p. 30.)

New York Central & Hudson River.—The gross earnings for the month of January were $7,185,768, an increase of $1,141,310.

Panama.—The United States Senate Committee on Appropriations has reported to the Senate the Urgent Deficiency bill, among the items of which is one of $650,000 "to be used as an advance to the Panama Railroad Company to pay for re-equipment of the company."

Rio Grande Western.—Spencer Trask & Company are offering at about 100 and interest a block of the $15,200,000 first mortgage 4 per cent. bonds of 1939 of this company. The bonds are a first lien on the main line and several branches, about 434 miles in all.

St. Louis & San Francisco.—On February 9, the directors of this company decided to pass the quarterly dividend of 1 per cent. on the $16,000,000 4 per cent. non-cumulative second preferred stock. In 1898, 1 per cent. annually was paid on this stock. In 1899 and 1900 2 per cent., in 1901 3½ per cent., and since then 4 per cent.

Southern.—This company is to issue $200,000,000 development and general mortgage 4 per cent. 50-year bonds. Of the total amount, $15,000,000 is to be issued immediately for the following purposes: $4,962,774 to refund payments for equipment heretofore made and charged to capital; $3,501,000 to refund investments in securities of, and advances to, subordinate companies and for the acquisition of property not heretofore funded; and $6,536,220 for construction. Of the remaining $185,000,000, $31,158,000 is to be reserved to retire divisional prior lien bonds on property acquired for which no provision is made by the consolidated mortgage; $16,000,000 to retire, not later than April 1, 1909, collateral trust 5 per cent. bonds; $10,000,000 to pay, not later than July 1, 1908, for the Eastern division of the Tennessee Central and for immediate improvements; $18,008,000 to retire equipment capital obligations as they mature in the next 15 years; $10,000,000 to acquire capital stocks of certain leased lines, and, finally, $99,834,000 to provide for future acquisitions and betterments, bonds for the latter purpose to be issued in amounts not exceeding $5,000,000 each year. J. P. Morgan & Co. will purchase the $15,000,000 of bonds to be issued immediately and also the first $5,000,000 to be issued thereafter.

Southern Pacific.—Gross earnings for the six months ended December 31 were $53,603,179, an increase of $4,133,045; net earnings, $19,112,463, an increase of $1,817,684.

Toronto Railway (Electric).—The dividends on the $7,000,000 outstanding capital stock will be at the rate of 6 per cent. annually, beginning in April. From 1898 to 1900 the rate was 4 per cent.; it was 4½ per cent. in 1901, and since then 5 per cent. annually.

Union Pacific.—This company has declared a semi-annual dividend of 3 per cent. on its $190,145,900 common stock. In February, 1900, a first semi-annual dividend of 1½ per cent. was paid; from that time, 2 per cent. was paid semi-annually until October, 1905, when one of 2½ per cent. was declared. U. P. stock declined one point on Wednesday following the announcement of the increased dividend.

The gross earnings for the half year ended December 31 were $35,817,084, an increase of $4,283,715, and net earnings $17,195,844, an increase of $1,981,133.

Wabash.—Gross earnings for the six months ended December 31 were $12,688,651, a decrease of $1,117,333; net earnings, $3,941,915, an increase of $782,047.

Washington Branch.—A 6 per cent. dividend has been declared on the $622,000 outstanding stock of this company, being the first since 1896, when 5 per cent. semi-annually was being paid. The State of Maryland owns $550,000 of this stock and the Legislature recently charged the Baltimore & Ohio, which owns $1,028,000 of the $1,650,000 authorized stock, with diverting the earnings of the subsidiary road to the parent company instead of paying dividends on W. B. stock.